E-ISSN: 2663-1067
P-ISSN: 2663-1075
www.hortijournal.com
IJHFS 2025; 7(1): 100-102
Received: 24-10-2024
Accepted: 28-11-2024

Ghanshyam
M.Sc. (Hort.), Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur Chhattisgarh, India

Dr. Pooja Gupta
Professor, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Dr. Vijay Kumar
Head of the Department, Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
Ghanshyam
M.Sc. (Hort.), Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur Chhattisgarh, India

Studies on the effect of plant geometry on vegetative attributes, flowering and corm production in Gladiolus (*Gladiolus grandiflorus* L.)

Ghanshyam, Pooja Gupta and Vijay Kumar

DOI: https://doi.org/10.33545/26631067.2025.v7.i1b.250

Abstract
The present study, "Studies on the Effect of Plant Geometry on Vegetative Attributes, Flowering, and Corm Production in Gladiolus (*Gladiolus grandiflorus* L.)", was conducted at the Horticulture Research cum Instructional Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), during the year 2023-24. The experiment was laid out in a Randomized Block Design with three replications, comprising seven treatments, viz.: T_1 (30 x 20 cm), T_2 (30 x 15 cm), T_3 (30 x 10 cm), T_4 (45 x 25 cm), T_5 (45 x 20 cm), T_6 (45 x 15 cm), T_7 (45 x 10 cm). The results showed that Number of corms/Plot (72.93), Number of corms/Plot (667750), Weight of corms/plot (3168.95 gm), corm weight (26408) kg, weight of cormels/Plot (173.33 gm), weight of cormels per plot (1444.4 kg) was observed under T_3 (30 x 10 cm).

Keywords: Gladiolus, plant geometry, vegetative attributes, flowering, corm production

Introduction
Gladiolus, often hailed as the queen of bulbous flowers, is celebrated for its striking flower spikes adorned with large florets in brilliant colors, attractive shapes, varying sizes, and excellent shelf life. The name "Gladiolus" comes from the Latin word "gladius" or "gladiator," a nod to its sword-like leaves, which also give it the popular name "sword lily." This exquisite flower was introduced into cultivation at the end of the 16th century (Parthasarathy and Nagaraju, 1999) [7]. It belongs to monocot family Iridaceae. It is primarily grown for its elegant appearance and long-lasting vase life, making gladiolus spikes a top choice for floral arrangements and attractive bouquets (Mishra *et al*., 2006) [5]. Proper spacing is crucial for high-quality gladiolus production, as it significantly influences plant growth, quality spikes, and corm and cormel development (Bijimol and Singh, 2001) [2].
Optimal spacing in gladiolus cultivation is essential for producing high-quality cut flowers and maximizing land use efficiency. It ensures good exposure to sunlight, conserves soil moisture, controls weeds, and provides essential nutrients for successive crop production and quality (Sanjib *et al*., 2002) [8]. The yield of corms and cormels in gladiolus is significantly influenced by various factors, including cultivar, plant spacing, corm size, nutrition, agro-techniques, and plant density. Among these, the size of the mother corm and spacing are particularly important (Singh and Bijimol, 2003; Mukhopadhyay and Yadav, 1984) [9, 6].

Materials and Methods
The present investigation was carried out at the Horticulture Research, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during Rabi season of the year 2023-24. Field preparation starts with ploughing the field once with a mould board plough, then harrowing, levelling and crop debris collection. well rotten FYM were incorporated into the soil at a rate of 15 tonnes per hectare during harrowing. Based on replications, the experimental field was divided into three blocks, with each block further subdivided into 7 sub-plots at a distance 0.5m. Healthy, uniform sized corms diameter ranging from 3 to 5 cm were planted in the experimental plots on the evening of 8 November 2023 after treating with Growth regulator solutions for 24 hours. The Corms were planted at 3-5 cm depth. Pre emergence irrigation was given just after planting of corms and then irrigation was given crop at an interval of 8-10 days as per the requirement through controlled flooding method.

Gladiolus spike was harvested when lower 1-2 florets has shown colour. Harvesting of spikes is done at 2-3 days intervals. Spikes were harvested at early morning.

Results and Discussion

Number of corms/plant

The data on the number of gladiolus corms per plant at the harvesting stage, influenced by different spacings, is shown in Table 1 Treatment T_4, with a spacing of 40 x 25 cm, recorded the highest number of corms per plant (3.60), which was statistically similar to Treatment T_5 with a spacing of 40 x 20 cm (3.13). Conversely, Treatment T_3, with a spacing of 30 x 10 cm, resulted in the lowest number of corms per plant (2.20). The increased number of corms per plant at the wider spacing (40 x 25 cm) is likely due to enhanced production and accumulation of photosynthates, which were then translocated to the underground parts of the plant, contributing to better corm development. This finding aligns with previous studies by Mane *et al*. (2006) [4], Bhat and Khan (2007) [1].

Number of corms/plot

The data in respect of total number of gladiolus corms per plot at harvesting stage as influenced by different spacing is presented in Table 1. The data showed that treatment T_3 (30 x 10 cm) maximum number of corms/plot (18) which was significantly *at par* with T_1 and T_5, while minimum was observed under the treatment T_3 (11.67). The increased yield observed with the 30 x 10 cm spacing can be attributed to the enhanced photosynthetic activity and more efficient translocation of nutrients to the underground parts of the plants. This spacing likely provided optimal conditions for plant growth, leading to better corm development and a higher overall yield. Thus, closer spacing appears to be more effective in maximizing gladiolus corm production by facilitating greater nutrient accumulation and utilization.

Number of corms/hectare

The data in respect of total number of gladiolus corms per hectare at harvesting stage as influenced by different spacing is presented in Table 1. The data showed that treatment T_3 (30 x 10 cm) maximum number of corms/ hectare (667750), while minimum was observed under the treatment T_4 (251333).

Table 1: Effect of plant geometry on number of corm/plant and number of corms/plot

Notation	Number of corms/plant	Number of corms/plot	Number of corms/hectare
T_1	2.20	44.00	366666
T_2	1.90	51.30	427500
T_3	1.82	72.93	667750
T_4	2.51	30.16	251333
T_5	2.20	33.00	275000
T_6	2.21	44.20	368333
T_7	2.09	62.70	522500
SEm±	0.05	0.90	
CD (0.05)	0.17	2.78	

Weight of corms/plant (g)

The data in respect of weight of corms per plant in gladiolus at harvesting stage as influenced by different spacing is presented in Table 2. The results show that treatment T_4, with a spacing of 40 x 25 cm, recorded the maximum weight of corm per plant (116.07 grams) which was found *at par* with the treatment T_5 (103.67 grams). In contrast, the minimum weight of corm per plant (79.07 grams) was recorded in treatment T_3, with a spacing of 30 x 10 cm. These results indicate that the maximum weight of corm per plant was achieved at the 40 x 25 cm spacing.

The greater corm weight in the 45 x 25 cm spacing is likely due to the increased availability of light, which enhances photosynthesis and consequently improves the production of photosynthates. Additionally, the wider spacing provides more area for root development and nutrient absorption, contributing to better corm growth. These findings align with the observations reported by Sonu Yadav and SK Bhatia (2018) [10], which also noted positive effects of different spacings on corm production in gladiolus.

Weight of corm/plot (g)

The data in respect of weight of corm in gladiolus at harvesting stage as influenced by different spacing and layout is presented in Table 2. The treatment with a spacing of 30 x 10 cm (T_3) recorded the highest corm weight at 1604.33 g, followed by the treatment with a spacing of 40 x 10 cm (T_7) at 1319.33 g, and the treatment with a spacing of 30 x 20 cm (T_1) at 1267.67 g. The minimum corm weight of 824.33 g was recorded in the treatment with a spacing of 40 x 25 cm (T_4). Therefore, it can be concluded that the highest corm weight was achieved with the spacing of 30 x 10 cm. It was highest with closer spacing and lowest with wider spacing. Mukhopadhyay and Yadav, (1984) [6] and Kuldip Kumar *et al.* (2016) [3] recorded more yield of corms and cormels per square meter with closer spacing.

Weight of corm/hectare (kg)

The data in respect of weight of corm in gladiolus at harvesting stage as influenced by different spacing and layout is presented in Table 2. The treatment with a spacing of 30 x 10 cm (T_3) recorded the highest corm weight at 26408 kg, followed by the treatment with a spacing of 40 x 10 cm (T_7) at 23272.9 kg. The minimum corm weight of 11686.3 kg was recorded in the treatment with a spacing of 40 x 25 cm (T_4).

Table 2: Effect of spacing on weight of corms/plant, weight of corms/plot and corms/hectare

Notation	Weight of corms/Plant (g)	Weight of corms/Plot (g)	Weight of corms/hectare (kg)
T_1	99.11	1985.35	16544.6
T_2	82.33	2222.83	18523.5
T_3	79.22	3168.95	26408
T_4	116.24	1402.35	11686.3
T_5	103.69	1559.78	12999
T_6	97.59	1955.89	16299.1
T_7	84.85	2792.74	23272.9
SEm±	2.47	92.74	
CD (0.05)	7.60	285.76	

Weight of cormel/plant (g)

The data in respect of weight of cormel in gladiolus at harvesting stage as influenced by different spacing and layout is presented in Table 3. The treatment T_4 have spacing 45 x 25 cm recorded significantly maximum weight of cormel (12.27 g) which was found at par with treatment T_1, T_5 and T_6. Whereas, minimum weight of cormel per plant (8 g) recorded in the treatment T_3 i.e. spacing 30 x 10 cm. From the above results, it is indicated that, the highest weight of cormel per plant was recorded in spacing 45 x 25 cm. This might be due to the availability of more light for synthesis of photosynthates and more area for better root growth and nutrient absorption in 45 x 25 cm spacing might have augmented production of cormel per plant. The positive response of different spacing on cormels production has been also reported by Kuldip Kumar *et al.* (2016) [3], and Sonu Yadav and SK Bhatia (2018) [10] in gladiolus.

Weight of cormels/plot (g)

The data in respect of weight of cormels per plot in gladiolus at harvesting stage as influenced by different spacing is presented in Table 3. The treatment T_3 have spacing 30 x 10 cm recorded significantly maximum weight of cormels per plot (173.33 g) which followed by found with the treatment T_1 have spacing 30 x 20 cm (149 g) and T_7 have spacing 40 x 10 cm (128.67 g). Whereas, minimum weight of cormels per plot (103.33 g) recorded in the treatment T_4 i.e. spacing 40 x 25 cm. From the above results, it is indicated that, the highest weight of cormel per plot was recorded in the spacing 30 x 10 cm. This might be due to the availability of more light for synthesis of photosynthates and more area for better root growth and nutrient absorption in 30 x 10 cm spacing might have been augmented production of cormels per plot. The positive response of different spacing on cormels production has been also reported by Kuldip Kumar *et al*. (2016) [3] in gladiolus.

Weight of cormels/hactare (kg)

The data in respect of weight of cormels per hactare in gladiolus at harvesting stage as influenced by different spacing is presented in Table 3. The treatment T_3 have spacing 30 x 10 cm recorded significantly maximum weight of cormels per hactare (1444.4 kg) which followed by found with the treatment T_5 have spacing 40 x 20 cm (1272 kg) and T_1 have spacing 30 x 20 cm (1241.7 kg). Whereas, minimum weight of cormels per hactare (861.1 kg) recorded in the treatment T_4 i.e. spacing 40 x 25 cm.

Table 3: Effect of plant geometry on weight of cormels/plant and cormels/plot

Notation	Weight of cormels/plant	Weight of cormels/plot	Weight of cormels/hectare (kg)
T_1	9.67^{abc}	149^{b}	1241.7
T_2	8.87^{c}	113.33^{cd}	944.4
T_3	8^{c}	173.33^{a}	1444.4
T_4	12.27^{a}	103.33^{d}	861.1
T_5	11.93^{ab}	106^{cd}	1272
T_6	9.93^{abc}	128^{bc}	1066.7
T_7	9.2^{bc}	128.68^{bc}	1072.3
SEm±	0.88	6.88	
CD (0.05)	2.72	21.19	

Concussion

In gladiolus cultivation, plant spacing significantly impacts corm and cormel production. Treatment T_4 (spacing 40 x 25 cm) produced the highest number of corms per plant, while T_3 (spacing 30 x 10 cm) yielded the lowest number. However, T_3 (30 x 10 cm) achieved the highest corms per hectare, as the closer spacing promoted efficient nutrient uptake. Treatment T_4 (40 x 25 cm) recorded the highest cormel weight per plant, suggesting that more space allows for better root growth and nutrient absorption. Additionally, T_3 produced the highest cormel weight per plot and hectare, indicating the benefits of closer spacing for maximizing yield.

References

1. Bhat ZA, Khan FU. Effect of spacing and corm size on growth, flowering and corm production in *Gladiolus* cv. White prosperity under Kashmir conditions. J Hort Sci. 2007;2(2):112-114.
2. Bijimol G, Singh AK. Effect of spacing and nitrogen on flowering, flower quality and post-harvest life of *Gladiolus*. J Appl Hortic. 2001;3(1):48-50.
3. Kumar K, Singh CN, Beniwal VS, Pinder R. Effect of spacing on growth, flowering and corm production of gladiolus (*Gladiolus* sp.) cv. American Beauty. Int J Environ Agric Biotechnol. 2016;1(3):2456-1878.
4. Mane PK, Bankar GH, Makne SS. Effect of spacing, bulb size and depth of planting on growth and bulb production in Tuberose (*Polianthes tuberosa*) cv. Single. Indian J Agric Res. 2006;40(1):64-67.
5. Mishra RL, Hussain CTS, Misra S. *Gladiolus*. Advances Ornam Hortic. Pointer Publ. Jodhpur, India. 2006;68-106.
6. Mukhopadhyay TK, Yadav LP. Effect of corms size and spacing on growth, flowering and corm production in *Gladiolus*. Haryana J Hortic Sci. 1984;13:95-99.
7. Parthasarathy VA, Nagaraju V. *Gladiolus*. In: Bose TK, Maiti RG, Shua RS, Das P, editors. Floriculture and Landscaping, c1999. p. 467-86.
8. Sanjib S, Talukdar, Sharma S, Misra RL, Sanya M. Effect of time spacing and depth of planting *Gladiolus*. Flora Res Trend India. 2002;7:243-245.
9. Singh AK, Bijimol G. Effect of spacing and nitrogen on *Gladiolus*. J Ornamental Hortic. 2003;6(1):73-75.
10. Yadav S, Bhatia SK. Effect of different plant density on vegetative characters, flowering and corm production in *Gladiolus* cv. Sancerre. J Pharmacogn Phytochem. 2018;7(2):302-304.