International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(2): 1772-1775

Received: 22-01-2020
Accepted: 24-02-2020

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Effect of horticultural techniques on corm and cormel production of *Gladiolus grandiflorus* cv. PDKV gold

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DOI: https://doi.org/10.22271/chemi.2020.v8.i2aa.9017

Abstract
The investigation entitled "Effect of horticultural techniques on corm and cormel production of *Gladiolus grandiflorus* cv. PDKV Gold" was carried out during kharif season of the year 2017-18 and 2018-19 at Floriculture unit, Department of Horticulture, Dr. PDKV., Akola. Vegetative, flowering and yield i.e. corm characteristics of gladiolus as affected by different horticultural techniques such as four different corm sizes, jumbo size corm (> 5.1 cm), large sized corm (3.8 to 5.0 cm), medium (3.2 to 3.7 cm), small size corm (3.1 to 2.5 cm) mechanical removal of apical bud (3.8 to 3.2 cm), half corm division (3.2 to 3.7 cm), soaking of corms in 200 ppm GA_3 solution for 24 hr (3.2 - 3.7 cm) and clipping of leaves (3.2 to 3.7 cm) were evaluated under natural agro-climatic conditions of Akola. The experiment was laid out in accordance with Complete Randomized Design with eight treatments replicated three times. Regarding growth parameters it was observed that days required for sprouting of corm, number of shoots per corm, plant height, number of leaves per plant, (at 30, 60, 90 and 120 DAP) length and breadth of leaves, jumbo size corm perform the best as compared to medium and small corms with maximum values (3.93 days), (2.03), (49.10, 91.63, 111.27 and 113.10 cm), (3.33, 6.13, 8.87 and 9.33 cm), (85.55 and 2.82 cm). Similar results were observed with flowering and yield parameters. In flowering parameter such as minimum days for spike emergence, days to 1st floret opening, days to 50% flowering (77.78, 82.08, 87.13 days respectively) and maximum number of spikes plant^{-1} (1.67) and ha^{-1} (1.48 lakh) was recorded in jumbo size corm than large and small size corm. Regarding yield parameter maximum number of corms and cormels plant^{-1}(2.23, 19) and ha^{-1} (2.48, 21.11 lakh), weight of single corm (54.67 g), weight of corms plant^{-1} (106.85 g) ha^{-1} (117.93 q) and diameter of corm (6.41 cm) was recorded in jumbo size corm. In case of quality parameter maximum length of spike, diameter of spike, length of rachis, number of florets spike^{-1} diameter of open floret and vase life of spike was observed by plants raised from jumbo sized corm.

Keywords: Horticultural techniques on corm and cormel production of *Gladiolus grandiflorus*

Introduction
Gladiolus (*Gladiolus grandiflorus*) is among the leading cut flowers and occupies eighth position in international cut flower trade (Ahmad *et al*., 2008) [1]. It is frequently used as cut flower in different social and religious ceremonies (Mitra, 1992) [8]. Gladiolus is very much liked for its majestic spikes which contain attractive, elegant and delicate florets. These florets open in a sequence over long duration and hence have a good keeping quality of cut spikes. The spikes of gladiolus are popular in flower arrangement and for preparing high-class bouquets (Mukhopadhay and Yadav, 1995) [10].

There is a wide range of colours; self or bicolour, with or without central mark, varying from white to darkest crimson. There are many varieties of gladiolus available like White Friendship, T-210, Pink Parade, Traelor, Red Majesty, Aarti, Poonam, Hunting Song, Oscare, Praha. PDKV Roshani, Mukta, Appleuse and Blue Mist etc. In European countries during winter season, snow and frost check the flower production and there is dearness of fresh flowers in the market. We are fortunate by having temperate, subtropical and tropical climatic conditions in our country and can produce the fresh flowers round the year with little efforts and can export the commodity to outside the country but export of fresh flowers including gladiolus is quite insignificant from India.

Different factors such as size of corms and cormels, planting time and fertilizer management influence the production and quality of gladiolus flower (Arora and Khanna, 1990) [2].

Gladiolus is a corm which has solid shortened stem with buds systematically arranged under a paper-thin protective layer or scale usually one bud sprouts near the top of the corm when planted. It also produces cormlets. The basal roots are emerged and flower spike is visible and basal portion of shoot that begins to swell and develops into daughter corm. The daughter corm continues to enlarge after flowering and then nutrition is directed downward for storage. The daughter corm does not flower in the same season (Hudson *et al*., 1981) [5]. The corm has direct effect on plant growth and flower quality (Sharga *et al*., 1984) [11]. Propagation of gladiolus is principally by the natural multiplication of new corms and cormels (Bose *et al*. 2003). However, its commercial cultivation is limited by low rate of multiplication. The low rate of corms and cormels production is one of the major constraints in commercial cultivation of gladiolus. Division of corms, removal of flower spike, leaf clipping, corm sizes, manual removal of apical bud and growth regulators GA_3 are some of the cultural tools to increase the corms and cormels production in gladiolus. Each technique has its own merits and limitations to act as satisfactory technique.

Hence, it is necessary to identify the suitable cultural practice/ practices for commercial cultivation of gladiolus and for higher production of corm and cormels. Therefore, the present investigation was carried out on effect of horticultural techniques on corm and cormels production of gladiolus with objective to study the effect of different horticultural techniques on corm and cormel production of gladiolus and to find out suitable horticultural techniques for corm and cormel production of gladiolus.

Materials and Methods

The experiment was conducted at Floriculture Unit, Department of Horticulture Dr. PDKV, Akola during the year 2017-18 and 2018-19 to study the effect of different horticultural techniques on corm and cormel production of gladiolus and to find out suitable horticultural techniques for corm and cormel production of gladiolus. Different corm size was jumbo (>5.1 cm), large (3.8-5.0 cm), medium (3.2-3.7 cm) small (2.5- 3.1 cm) in diameter, mechanical removal of apical bud, half corm division (3.2 - 3.7 cm), soaking of corms in 200 ppm GA_3 solution for 24 hr (3.2 - 3.7 cm) and clipping of leaves (3.2 - 3.7 cm). There were 30 corms in each treatment planted 5 cm deep in 14 x 16 inches (30 x 35 cm) size black colour polyethylene bags which were filled with river soil + sand + FYM in 2:1:1 proportion. In each bag as per treatment single corm was planted. The size of main plot was 3m x 1m. First irrigation was given just after planting of corm and then subsequent irrigation was applied as per crop requirement. All standard cultural practices required for raising crop were practiced.

The experiment was laid out according to Completely Randomized Design with eight treatments replicated three times. Data were collected on various growth, flowering, yield and quality parameter like days required for sprouting of corm, number of shoots per corm, plant height, number of leaves per plant, (at 30, 60, 90 and 120 DAP) length and breadth of leaves, minimum days for spike emergence, days to 1st floret opening, days to 50% flowering and maximum number of spikes plant^{-1} and ha^{-1} maximum number of corms and cormels plant^{-1}and ha^{-1}, weight of single corm, weight of corms plant^{-1} ha^{-1} and diameter of corm, length of spike, diameter of spike, length of rachis, number of florets spike^{-1} diameter of open floret and vase life of spike was recorded. The data collected on various characters were statistically analyzed.

Results and Discussion

The results obtained from the present investigation as well as discussion have been summarized under following heading.

Growth parameters

The results clearly indicate a significance influence of corm size on growth in gladiolus (Table 1a Table 1b). Jumbo size corms took significantly less number of days (3.93) for sprouting of corm. Bigger sized corms produced more number of shoots per corm (2.03), maximum plant height at 30, 60, 90 and 120 DAP (49.10, 91.63, 111.27 and 113.10 cm) and more number of leaves (3.33, 6.13, 8.87 and 9.33 cm) plant^{-1} at 30, 60, 90 and 120 DAP. Significant increase in plant height with increase in corm size might be due to more quantity of stored food materials available in jumbo and large corms, which might have helped in rapid vegetative growth of the plant. Also this may be due to more stored food material and sufficient hormone in whole corm which helped in early and rapid plant growth. Cutting of corm may also cause leaching of nutrients which results shorter plant.

Similar finding were reported by Mukhopadhyay and Yadav (1984) [9] and they observed height of plant significantly increased with the increase of corm size. These results were also supported by the Mahanta *et al*. (1998) [7]. Maximum length of leaf (85.55 cm) and breadth of leaf (2.82 cm) was recorded in jumbo size corm as compared to large, medium and small size corms. This could be due to higher amounts of stored food reserves in jumbo size corms.

Flowering parameters

Flowering parameter also significantly influenced by corm size. Minimum days for spike emergence, days to 1st floret opening and days to 50% flowering (77.78, 82.08, 87.13 days) was recorded in jumbo size corm followed by large size corm. Significantly maximum number of spikes plant^{-1} (1.67) and ha^{-1} (1.48 lakh) was recorded in jumbo size corm. However, significantly minimum number of spikes plant^{-1} (0.97) and ha^{-1} (1.09 lakh) were recorded by treatment T_4 i.e. small size corm. The number of spikes plant^{-1} in gladiolus increased with increase in size of corm. Flowers are important sink organs in bulbous flowering plants that depend on the reserves stored in the bulb for their initial growth and development. Large bulbs have higher reserves than small bulbs and this might have been the reason for production of maximum spikes with larger corms of gladiolus. The results are in accordance with Singh *et al.* (2011) [13] in gladiolus.

Yield parameters

Corm and cormel production was significantly affected by different horticultural techniques (Table 2). Significantly higher number of corms (2.23, 2.48 lakh) cormels (19, 21.11 lakh) plant^{-1} and ha^{-1} were produced in jumbo size corm which was followed by treatment T_2. More number of corms plant^{-1} and ha^{-1} were recorded with jumbo and large sized corm which might be due to presence of higher amount of reserved food material in the mother corms as compared to medium and small sized corms which resulted in better vegetative as well as reproductive growth of the plant and further development of underground plant parts i.e. corms and cormels. The results are in accordance with the findings of Joshi *et al.* (2011) [6] in gladiolus. Singh (1996) reported that maximum number of corms per plant was obtained under

whole corm treatment than half corm and quarter corm treatment.

Weight of corms (106.85 g and 117.93q) and cormels (14.14 g and 17.83 q) plant^{-1} and ha^{-1} significantly maximum in jumbo size corm treatment than rest of all treatments (Table 3). Similar findings were reported by Shiraz and Maurya (2005) [12] in gladiolus. The results are further in relation with Barman *et al*. (2006) [3] who observed that the heaviest corm was observed from whole corm which was statistically different from half and quarter corm treatments, which is in conformity with finding of Hatibarua *et al*. (1989) [4].

Maximum diameter of corm (6.41 cm) and weight of single corm (54.67 g) recorded in jumbo size corm which was significantly superior than rest of all the treatments (Table 4). This was followed by the treatment T_2 (5.87 cm). Better performance of the plants from jumbo and larger corms might be due to the better growth of the plants. Also this might be due to availability of more amount of stored food material in jumbo and large sized mother corms. The observation is similar to the findings of Mukhopadhyay and Yadav (1984) [9] in gladiolus.

Table 1a: Effect of different horticultural techniques on days required for sprouting, number of shoots per corm, length and breadth of leaf

Treatment	Days for sprouting of corm			Number of shoots corm^{-1}			Length of leaf (cm)			Breadth of leaf (cm)		
	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1	4.07	3.80	3.93	2.00	2.07	2.03	85.73	85.37	85.55	2.78	2.86	2.82
T_2	7.00	7.17	7.08	1.60	1.73	1.67	72.93	75.10	74.02	2.65	2.67	2.66
T_3	8.57	8.40	8.48	1.33	1.53	1.43	58.67	60.87	59.77	2.44	2.39	2.42
T_4	10.00	10.57	10.28	1.20	1.20	1.20	35.80	39.03	37.42	1.90	1.84	1.87
T_5	15.13	14.80	14.97	1.37	1.43	1.40	46.00	49.23	47.62	2.35	2.33	2.34
T_6	12.13	12.93	12.53	1.20	1.33	1.27	37.60	40.47	39.03	2.04	1.95	2.00
T_7	8.23	8.23	8.23	1.50	1.63	1.57	60.93	63.07	62.00	2.49	2.43	2.46
T_8	8.67	8.60	8.63	1.40	1.47	1.43	53.07	53.97	53.52	2.45	2.39	2.42
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.17	0.21	0.17	0.13	0.14	0.09	0.88	1.32	0.98	0.04	0.05	0.04
CD at 5%	0.51	0.65	0.51	0.39	0.42	0.28	2.66	3.96	2.95	0.12	0.16	0.12

Table 1b: Effect of different horticultural techniques on plant height (cm)

Treatment	Plant height (cm)											
	30 DAP			60 DAP			90 DAP			120 DAP		
	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1	50.53	47.67	49.10	91.00	92.27	91.63	102.27	120.27	111.27	103.93	122.27	113.10
T_2	48.60	43.60	46.10	82.73	89.73	86.23	85.33	112.07	98.70	86.40	117.20	101.80
T_3	37.93	38.53	38.23	68.47	71.53	70.00	72.73	87.20	79.97	73.87	93.67	83.77
T_4	32.70	31.87	32.28	49.87	65.27	57.57	53.87	85.60	69.73	55.13	89.73	72.43
T_5	34.20	36.73	35.47	50.13	73.33	61.73	59.33	80.20	69.77	60.47	90.10	75.28
T_6	29.73	36.87	33.30	45.33	67.27	56.30	54.60	80.53	67.57	56.20	86.27	71.23
T_7	41.53	42.23	41.88	69.02	71.90	70.46	73.57	90.30	81.93	74.23	94.53	84.38
T_8	36.80	39.47	38.13	68.87	67.67	68.27	71.23	85.60	78.42	72.07	87.70	79.88
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	2.14	2.24	1.68	3.17	4.48	2.74	3.70	5.35	3.59	3.64	4.64	3.13
CD at 5%	6.44	6.72	5.05	9.51	13.45	8.23	11.10	16.06	10.77	10.94	13.85	9.39

Table 2: Effect of different horticultural techniques on number of corm and cormels plant^{-1} and ha^{-1}

Treatment	Number of corms plant^{-1}			Number of corms ha^{-1}			Number of cormels plant^{-1}			Number of cormels ha^{-1}		
	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled
T_1	2.40	2.07	2.23	2.66	2.29	2.48	18.80	19.20	19.00	20.88	21.33	21.11
T_2	2.07	1.80	1.93	2.29	2.00	2.15	11.73	16.00	13.87	13.03	17.77	15.40
T_3	1.87	1.47	1.67	2.07	1.63	1.85	9.33	9.67	9.50	10.37	10.41	10.39
T_4	1.33	1.27	1.30	1.48	1.40	1.44	2.80	4.80	3.80	3.11	4.40	3.75
T_5	1.60	1.67	1.63	1.77	1.85	1.81	10.63	10.40	10.52	10.79	10.78	10.79
T_6	1.67	1.33	1.50	1.85	1.48	1.66	2.80	4.60	3.70	3.15	4.33	3.74
T_7	1.93	1.53	1.73	2.19	1.70	1.94	10.47	10.10	10.28	10.40	10.43	10.41
T_8	1.73	1.40	1.57	1.92	1.55	1.74	10.53	10.13	10.33	10.77	10.72	10.74
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.19	0.15	0.13	0.21	0.17	0.14	1.08	1.18	0.93	0.90	1.36	0.97
CD at 5%	0.57	0.47	0.39	0.65	0.52	0.44	3.26	3.56	2.80	2.70	4.10	2.93

Table 3: Effect of different horticultural techniques on weight of corm and cormels plant^{-1} and ha^{-1}

Treatment	Weight of corms plant^{-1} (g)			Weight of corms ha^{-1} (q)			Weight of cormels plant^{-1} (g)			Weight of cormels ha^{-1} (q)		
	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled
T_1	104.40	109.31	106.85	115.99	119.87	117.93	14.03	14.26	14.14	17.15	18.50	17.83
T_2	77.40	79.58	78.49	85.99	88.41	87.20	7.51	9.53	8.52	8.35	11.25	9.80
T_3	43.67	44.62	44.14	48.51	49.44	48.98	5.49	5.80	5.65	6.11	6.58	6.35
T_4	15.27	31.16	23.21	25.61	34.60	30.11	2.10	2.24	2.17	2.35	2.69	2.52
T_5	21.07	40.23	30.65	22.66	38.07	30.37	5.67	6.00	5.83	6.74	6.83	6.79
T_6	31.47	33.90	32.68	34.96	37.50	36.23	2.14	4.13	3.13	2.79	2.96	2.88
T_7	49.87	51.15	50.51	52.70	53.57	53.14	5.51	5.85	5.68	6.50	6.77	6.63
T_8	38.80	42.62	40.71	43.11	49.37	46.24	5.64	5.90	5.77	6.65	6.80	6.73
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	3.71	3.61	2.44	4.16	4.20	2.47	0.58	0.60	0.40	0.96	0.76	0.80
CD at 5%	11.83	10.83	7.32	12.49	12.60	7.52	1.76	1.80	1.20	2.89	2.29	2.42

Table 4: Effect of different horticultural techniques on diameter of corm and weight of single corm.

Treatment	Diameter of corm (cm)			Weight of single corm (g)		
	2017- 18	2018-19	Pooled	2017- 18	2018-19	Pooled
T_1	6.01	6.81	6.41	56.40	52.95	54.67
T_2	5.43	6.31	5.87	39.13	46.15	42.64
T_3	4.72	5.34	5.03	29.20	35.31	32.25
T_4	3.48	4.70	4.09	12.73	23.67	18.20
T_5	3.74	5.13	4.43	15.13	32.50	23.82
T_6	4.30	5.17	4.74	16.33	28.26	22.30
T_7	5.00	5.67	5.34	32.07	39.66	35.86
T_8	4.68	5.17	4.92	24.53	35.05	29.79
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.15	0.19	0.11	3.11	4.20	1.86
CD at 5%	0.45	0.59	0.34	9.23	12.62	5.58

References

1. Ahmad T, Ahmad I, Qasim M. Present status and future prospects of gladiolus cultivation in Punjab, Pakistan. J Tekirdag Agric. Faculty. (In Press).
2. Arora JS, Khanna K. Studies on corm production in gladiolus as affected by different corm sizes. Indian J Hort. 1990; 47:442-446.
3. Barman D, Rajni K, Ram Pal, Upadhyay RC. Studies on corm and cormel production in gladiolus. J Ornamental. Hort., 2006; 9(2):118-121.
4. Hatibaura P, Paswan L, Gogoi S. Effect of corm size and their divisions on corm and cormel production of gladiolus. Annals of Biology. 1989; 13(2):259-261.
5. Hudson TH, William JF, Anton MK. Plant Sciences. Engle Wood Clifts. New Jersey, 07632, USA, 1981, 676.
6. Joshi KR, Gautam DM, Baral DR, Pun UK. Effect of corm size and varieties on corm/cormels production and vase life of gladiolus. Nepal J Sci. & Tech. 2011; 12:35-40.
7. Mahanta P, Paswan L, Siddique AB. Effect of bulb size on growth and flowering of tuberose (*Polianthus tuberose* L.) cv. Single. Annals. Agri. Bio. Res. 1998; 3(1):35-38.
8. Mitra R. Gladiolus. In: Fuler Bagan (In Bangla) 3rd ed. Indian Book Academy, Calcutta, India. 1992, 158-168.
9. Mukhopadhyay TP, Yadav LP. Effect of corm size and spacing on growth, flowering and corm production in gladiolus. Haryana J Hort. Sci. 1984; 13(3, 4):95-99.
10. Mukhopadhay TK, Yadav LP. Effects of corm size and spacing on growth, flowering and production of gladiolus. Haryana J Hort. Sci. 1995; 13:95-99.
11. Sharga AN. Effect of bulb size on vegetative growth and flower characters of tuberose (*Polianthus tuberose* L.). Progressive Hort. 1982; 14(4):258-260.
12. Shiraz A, Maurya KR. Effect of spacing and corm size on growth, flowering and corm production in gladiolus. Indian J Hort. 2005; 62(1):95-96.
13. Singh KP, Gaganana TM, Subramanayam KV. Effect of planting densities on yield and economics of gladiolus. Annals of Hort. 2011; 4(1):104-105.