

**Response of various organic manures and its combinations on growth, flowering and cormels of gladiolus**

**ABSTRACT**

A field experiment was conducted at Agriculture Farm School of Agricultural Sciences and Technology, RIMT University, Mandi Gobindgarh (Punjab) during November-April (2022-23) to study the response of various organic manure and its combination on growth, flowering and corm attributes of gladiolus cultivar Punjab Dawn. The experiment consisted of ten treatments by combining cow dung, cow urine, milk, curd, ghee, jiggery, flour, soil, water, pulse flour, mustard oil and honey at different amounts along with control and replicated thrice. Treatment T<sub>7</sub> recorded with minimum days to sprouting (17.44 days), tallest plant height (88.97 cm), maximum leaf length (38.16 cm), wider leaf breadth (2.80 cm), minimum days to complete sprouting (8.00 days), minimum days to spike emergence (99.55 days) and lesser days to the first colour shown (103.11 days) whereas, more number of leaves/plant (10.11), a greater weight of individual cormel (0.45 g), the weight of cormels/corm (3.04 g) and greater cormel diameter (0.51 cm) were measured with treatment T<sub>5</sub> and maximum rachis length (37.96 cm), longer duration of flowering (6.14 days) and more number of cormels/corm (8.51), were resulted by treatment T<sub>2</sub>, T<sub>6</sub> and T<sub>3</sub>, respectively.

**KEYWORDS:** organic manures, gladiolus, flowering, combination on growth

**1. INTRODUCTION**

“Gladiolus botanically called *Gladiolus grandiflorus* L. (2n = 30) belongs to the family Iridaceae. It is one in all the foremost cultivated, cut flowers worldwide. Gladiolus is native to climate of African nation” [25]. “The rubric Gladiolus includes regarding hundred and eighty species with over 10,000 cultivars of that regarding twenty species completed grown commercially for cut flower products” [3]. “It’s a downtime season crop still are frequently completely grown throughout season in low-rain areas with delicate climates. Gladiolus is allowed as queen of the bulbous shops, its big selection in shat has forms, color and color duos that makes it all well-liked for floral arrangement” [18]. “Organic manure is a natural product used by producers to offer food (food nutrients) to crop shops. Organic coprolites include yard ordure, inexperienced coprolites compost made from crop remnants and essential ranch wastes, vermicompost, oil planting galettes and natural wastes - beast bones, bloodbath home rubbish. It is the most natural and chemical-free ingredient for increasing crop output and improving soil product performance. There are two types of organic manure in the market i.e. bulky organic manure, which contains farm yard manure that is a mixture of materials such as bovine dung, urine, litter or crop straw and among others. It is left there to decompose until it is removed and planted in the fields. This compost will be ready in three to four months and contains 0.50% N, 0.20% P<sub>2</sub>O<sub>5</sub> and 0.50% K<sub>2</sub>O in well-rotted manure. Concentrate Organic Manure is the second sort of organic manure, when oil is removed from oil seeds, the remaining solid part is dried into cake form and can be utilized as manure. It improves the physicochemical and biological composition of the soil as well as removes the deficiency of essential nutrients and this leads to healthy growth of plants and increases the production of crops. Due to this, the storage capacity and food composition of horticultural crops is improved their quality also improves and their nutritional value is also seen to have a good effect” [33]. “Another organic manure manufactured

from five different cow byproducts, including cow dung, cow urine, cow milk, cow ghee and cow curd, also called Panchgavya. It could perhaps play a part in fostering growth and supplying immunity in factory systems, consequently supplying resistance against blighters and circumstances. Jeevamrit is made by combining 1 kg dung, 1 liter urine, 200 g jiggery, 200 g flour and 100 g soil in a large tank, keeping the tank in the shade, covering it with a breathable jute bag, and leaving it. The mixes were incubated in the shade for 5 days and forcefully stirred with a wooden stick for 10-15 minutes three times a day. Amritpani is known as elixir for dead soil. It contains a wide range nutrients that not only improve the soil's physical, chemical and biological health but also stimulate plant growth, yield and quality. For the preparation of Amritpani, cow dung, cow ghee, honey and water are mostly used. Preparation of Amritpani requires 1 kg fresh cow dung, 1 liter fresh cow urine, 1 kg green neem leaves, 1 kg pulse flour, 100 g jiggery and 10 liters water in cow urine for 12 hours. For vegetables, root dipping in Amritpani can be done before transplanting of seedlings" [28].

## 2. MATERIALS AND METHODS

A field experiment was conducted at Agriculture Farm School of Agricultural Sciences and Technology, RIMT University, MandiGobindgarh (Punjab) from November 2022 to April 2023. The experiment field has light clay loamy soil with normal organic matter, uniform topography, and good drainage facility. The treatments consist of  $T_0$ : Control,  $T_1$ : Cow urine + cow dung (2 L + 1 kg),  $T_2$ : Cow milk + cow curd (1 L + 1 L),  $T_3$ : Cow dung + cow urine + milk + curd + ghee (500 g + 500 ml + 100 ml + 100 ml + 500 g),  $T_4$ : Cow urine + jiggery + flour (2 L + 500 g + 500 g),  $T_5$ : Cow dung + soil + jiggery + water (2 kg + 1 kg + 0.5 kg + 15 l),  $T_6$ : Cow dung + cow urine + pulse flour + jiggery (500 g + 400 ml + 100 g + 100 g),  $T_7$ : Mustard oil + honey (500 ml + 250 ml),  $T_8$ : Cow dung + honey + water (1 kg + 250 ml + 200 ml) and  $T_9$ : Water + cow dung + jiggery + mustard oil (1 L + 500 g + 25 gm + 12.50 ml). The experiment contains ten treatments and is replicated thrice under randomized block design (RBD). The obtained data on growth, flowering and corms were subjected to statistical analysis of variance method [21].

## 3. RESULTS AND DISCUSSION

The data pertaining to growth parameters is depicted in table 1. The minimum number of days taken to sprouting (17.44 days) resulted in treatment  $T_7$  whereas, treatment  $T_0$  was recorded with the maximum number of days to sprouting (22.33 days). "The early sprouting of gladiolus corm may be because the application of organic manures improved soil texture by loosening the soil, preventing the formation of soil crust and increasing water holding capacity as well as proper aeration that may result in earlier corm sprouting". [11] and [30]. The tallest plant height (88.97 cm) was resulted by treatment  $T_7$  while, the smallest plant (82.37 cm) was measured under  $T_0$  (control). The probable reason for increasing plant height in the best treatment is due to the application of organic manures i.e. FYM acts as a slow release and is rich in nutrients, a small amount of nitrogen is directly available to the plant while a large portion is made available when the FYM decomposes [24]. The same results were also reported by [36] and [35]. The maximum number of leaves/plant (10.11) were counted with treatment  $T_5$  whereas, the lesser number of leaves/plant was counted in treatment  $T_0$  (8.55). "Increasing the number of leaves with the application of organic manure may be due to increased nitrogen availability as it is a constituent of protein, the component of protoplast and increases the chlorophyll content in leaves. All these factors contribute to cell multiplication, cell enlargement and differentiation which could have resulted in better photosynthesis and ultimately exhibited better vegetative growth" [9] and [37].

Present findings were according to the findings of [37] and [13]. “The maximum leaf length (38.16 cm) was measured by treatment T<sub>7</sub> whereas, treatment T<sub>0</sub> was recorded with minimum leaf length(32.55 cm). The increased leaf length particularly may be due to the availability of more nitrogen continuously due to the application of chemical and bio-fertilizers resulting in abundant vegetative growth. Phosphorus stimulates the root system through efficient translocation of certain growth-stimulating substances formed in plants, which may have enhanced the absorption of nutrients thus resulting in vigorous growth. Plant supplied with high phosphorus and potassium with nitrogen continuously maintains vegetative growth. Nitrogen is a constituent of protein, a component of protoplast and increases the chlorophyll content in leaves” [4] and [15].The widest leaf breadth (2.80 cm) was measured under treatment T<sub>7</sub> and the narrowest leaf breadth(1.63 cm) was observed by treatment T<sub>0</sub> (control). Application of RDF with biofertilizers promoting the leaf width is influenced by nitrogen application, because nitrogen is an essential part of nucleic acid, which plays a vital role in promoting leaf area. All these factors contribute to cell multiplication, cell enlargement and differentiation which could have resulted in better photosynthesis and ultimately exhibited better vegetative growth [27] and [29].The minimum number of days taken to complete sprouting (8 days) was reported in treatment T<sub>7</sub> whereas, treatment T<sub>1</sub> was recorded with the maximum number of days to complete sprouting (10 days). The earliness in sprouting may be due to the inoculation with bacterial mixtures provided a more balanced nutrition for plants and optimum absorption of organic and inorganic by corms enhanced the physiological process and improved the germination. Which promotes the sprouting by enhanced cell division and enlargement, leading to proper germination? Results are in consonance with the finding of [10], [2] and [27].

Table 1 has the result related to flowering parameters. The minimum days to spike emergence (99.55 days) were counted in treatment T<sub>7</sub> and treatment T<sub>2</sub> counted with maximum number of days to spike emergence(102.73 days). It may be due to the early loss of apical dominance, followed by easier and better nutrient translocation to the plant, that may improved plant growth due to increased nutrient availability, and accelerated mobility of photosynthates from source to sink as influenced by growth hormones released or synthesized from organic manures that may be enhanced to early spike emergence. These findings are in conformity with the results obtained by [26], [20] and [17]. The minimum days to the first colour shown (103.11days) was counted in treatment T<sub>7</sub> whereas, treatment T<sub>8</sub> observed with maximum number of days to first colour shown (111.44 days). Initiation in the best treatment is due to the application of FYM increases the concentration of phosphorus and potassium due to the solubility effect of certain organic matter, the increased microbial activity due to the application of FYM enhanced the process of mineralization that lead to more uptake of phosphorus and potassium. Similar results were also reported by [1], [22],[23] and [16].The longest rachis length (37.96 cm) was found in treatment T<sub>2</sub> whereas, treatment T<sub>0</sub> resulted smallest rachis length(33.32 cm). Rachis length may have increased due to increased nutrient availability from organic manure and translocation of higher amounts of photosynthesis, and maintenance of proper physiological activities of the plant, resulting in more food, which may have been used for better rachis length development. Similar findings were also reported by [19], [32], [34], [10] and [6].The maximum duration of flowering (6.14 days) was counted in treatment T<sub>6</sub> while, treatment T<sub>0</sub> shows a minimumduration of flowering(5.03 days). The beneficial effect of INM on earliness of spike emergence could be attributed to the good vegetative and reproductive growth of plants which in turn resulted in early floret opening [12].

The cormel parameters are cited in table 1. A more number of cormels/corm (8.51) were counted in treatment T<sub>3</sub> whereas, treatment T<sub>9</sub> was recorded with a minimum number of cormel/corm (7.11). Treatment T<sub>6</sub> resulted the maximum weight of the individual cormel(0.45 g) and minimum weight of the individual cormel(0.38 g) was obtained with treatment T<sub>0</sub>. The maximum weight of cormel/corm (3.04 g) resulted in treatment T<sub>5</sub> whereas, treatment T<sub>1</sub> (control) was recorded with a minimum weight of cormel/corm (3.02 g). Better cormels production might be due to the combine application of organic manure and bio fertilizers, they have stored more carbohydrates through effective photosynthesis. The increase in corms weight might be due to the storage of carbohydrates and nitrogen compounds in the corms. Sufficient N and P continuously maintain vegetative growth leading to an increase in photosynthetic area, resulting in more accumulation of assimilates and partitioning to the developing corms and cormels. This may be due to the ability of organic manure and bio fertilizers to produce growth promoting substances such as IAA and gibberellins like substances viz., vitamins and riboflavin etc. which might have helped in increasing the size and weight of corms and cormels. Similar findings were also reported by [5], [14], [7] and [31]. The maximum cormel diameter (0.51 cm) was measured in treatment T<sub>5</sub> and treatment T<sub>3</sub> was recorded with a minimum cormel diameter (0.43 cm). The Increase in average diameter and weight of corms and cormels due to the application of biofertilizers might be due to the fact that it increased nutrients availability to the plants, which increases the photosynthetic activity of the plants and thereby, hastens the movement of photosynthetic sink towards the source (corm). Moreover, it also increases carbohydrates and auxin concentration in the roots resulting in thicker and well-branched roots as observed by [29] and [8].

#### 4. CONCLUSION

It is concluded that a significant effect of various organic manures and their consortium was observed on growth, flowering and cormel attributes of gladiolus. Most of the parameters i.e. days to sprouting (days), plant height (cm), leaf length (cm), leaf breadth (cm) days to complete sprouting (days), days to spike emergence (days) and days to the first colour shown (days) are significantly enhanced by the application of mustard oil + honey (500 ml + 250 ml) while, application of cow dung + soil + jiggery + water (2 kg + 1 kg + 0.5 kg + 15 L) exerted a highly positive effect on the number of leaves/plant, the weight of individual cormel (g), weight of cormels/corm (g) and cormel diameter(cm).

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UNDER PEER REVIEW

**Table 1. Response of various organic manures and its combination on growth, flowering and cormel parameters of gladiolus.**

Treatments	Days to Sprouting (days)	Plant height (cm)	Number of leaves/plant	Leaf length (cm)	Leaf breadth (cm)	Days to complete sprouting (days)	Days to spike emergence (days)	Days to first colour shown (days)	Rachis length (cm)	Duration of flowering (days)	Number of cormels/corn	Weight of individual cormel (g)	Weight of cormels /corn (g)	Cormel diameter (cm)
T <sub>0</sub>	22.33	82.37	8.55	32.55	1.63	9.00	101.57	107.88	33.32	5.03	7.33	0.38	3.02	0.50
T <sub>1</sub>	19.67	84.17	9.84	35.26	2.24	10.00	102.42	108.00	36.53	5.78	8.00	0.38	3.03	0.47
T <sub>2</sub>	18.26	86.64	9.11	34.27	2.56	9.00	102.73	109.69	37.96	6.13	7.29	0.43	3.02	0.46
T <sub>3</sub>	18.33	82.58	8.82	33.56	2.04	8.33	99.88	108.55	37.12	6.10	8.51	0.43	3.02	0.43
T <sub>4</sub>	20.75	86.03	9.86	35.66	2.08	10.00	102.22	105.66	37.71	5.22	7.59	0.41	3.03	0.43
T <sub>5</sub>	17.55	87.41	10.11	36.00	2.77	9.00	102.48	106.66	37.74	5.83	8.29	0.45	3.04	0.51
T <sub>6</sub>	20.01	84.97	9.23	35.46	2.04	8.66	101.07	109.11	35.40	6.14	7.66	0.41	3.02	0.36
T <sub>7</sub>	17.44	88.97	10.10	38.16	2.80	8.00	99.55	103.11	37.73	6.06	7.85	0.38	3.03	0.49
T <sub>8</sub>	20.41	85.68	10.00	32.55	2.28	10.33	100.95	111.44	36.34	5.65	8.40	0.43	3.03	0.47
T <sub>9</sub>	19.14	87.60	9.23	34.76	2.23	9.33	101.22	108.66	37.25	5.90	7.11	0.43	3.04	0.41
Sem	0.72	1.015	0.250	1.082	0.210	0.426	0.784	1.62	0.82	0.18	0.37	0.0199	0.0049	0.0282
CD at 5%	2.14	3.017	0.743	3.217	0.624	1.265	2.33	4.82	2.459	0.54	1.10	0.0590	0.0144	0.0837