Original Research Article

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 manures and its combination on growth, flowering and corm attributes of gladiolus ~~cultivar~~ cv. Punjab Dawn. The experiment consists of ten treatments by combining cow dung, cow urine, milk, curd, ghee, ja~~i~~ggery, flour, soil, water, pulse flour, mustard oil and honey at different amount along with control and replicated thrice. Treatment T_7 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 first colour shown (103.11 days) whereas, maximum ~~more~~ number of leaves/plant (10.11), ~~greater~~ weight of individual cormel (0.43 g), weight of cormels/corm (3.04 g) and ~~greater~~ cormel diameter (cm) were measured with treatment T_5 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_2, T_6 and T_3, respectively.

KEYWORDS:

1. INTRODUCTION

Gladiolus botanically called *Gladiolus grandiflorus* L. (2n = 30) belong~~sing~~ to the family Iridaceae. It is one in all the foremost cultivated, artificial cut flower worldwide. Gladiolus is native to climate zone 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 product [3]. It's a downtime season crop still are frequently completely grown throughout season in low rain areas with delicate climate. Gladiolus is ~~allowed~~ known as queen of the bulbous ~~shops~~flowers, 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_2O5 and 0.50% K_2O in well-rotted manure. Concentrated 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 and its 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

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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 wide range nutrients which not only improve the soil physical, chemical and biological health, but also stimulate plant growth, yield and quality. For 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 litters water in cow urine for 12 hours. For vegetables, root dipping in Amritpani can be done prior to transplanting of seedlings [28].

2. MATERIALS AND METHODS

A field experiment was conducted at Agriculture Farm School of Agricultural Sciences and Technology, RIMT University, Mandi Gobindgarh (Punjab) during November-April (2022-2023. 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 replicated thrice under randomized block design (RBD). The obtained data on growth, flowering and cormels were subjected to statistical analysis of variance method [21].

3. RESULTS AND DISCUSSION

The data pertaining on growth parameters is depicted in table 1. The minimum number of days taken to sprouting (17.44 days) was resulted in treatment T_7 whereas, treatment T_0 was recorded with maximum number of days to sprouting (22.33 days). The early sprouting of gladiolus corm may be because the application of organic manures which 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 be resulting in earlier corm sprouting. The results can be in conformity with the findings of [11] and [30]. The tallest plant height (88.97 cm) was resulted by treatment T_7 while, 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 application of organic manures i.e. FYM act as a slow release manure and rich in nutrients, a small amount of nitrogen is directly available to the plant while a large portion of it is made available when the FYM decomposes [24]. Same results were also reported by [37] and [35]. The maximum number of leaves/plant (10.11) were counted with treatment T_5 whereas, lesser number of leaves/plant was counted in treatment T_0 (8.55). Increasing the number of leaves with application of organic manure may be due to increased nitrogen availability as it is a constituent of protein, 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 [38]. Present findings were according with

the findings of [38] and [13]. The maximum leaf length (38.16 cm) was measured by treatment T_7 whereas, treatment T_0 recorded with minimum leaf length (32.55 cm). The increase leaf length particularly may be due to the availability of more nitrogen continuously due to application of chemical and bio fertilizers resulting into abundant vegetative growth. Phosphorus stimulates root system through efficient translocation of certain growth stimulating substance formed in plant, which may have enhanced the absorption of nutrients thus resulting in a vigorous growth. Plant supplied with high phosphorus and potassium with nitrogen continuously maintains vegetative growth. Nitrogen is a constituent of protein, component of protoplast and increases the chlorophyll content in leaves [4] and [15]. The widest leaf breadth (2.80 cm) was measured under by treatment T_7 and narrowest leaf breadth (1.63 cm) was observed by treatment T_0 (control). Application of RDF with biofertilizers promoting the leaf width influenced with nitrogen application, because nitrogen is an essential part of nucleic acid, which play 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_7 whereas, treatment T_1 was recorded with 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 finding of [10], [2] and [27].

Table 1 is having the result related on flowering parameters. The minimum days to spike emergence (99.55 days) were counted in treatment T_7 and treatment T_2 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 conformity with the results obtained by [26], [20] and [17]. The minimum days to first colour shown (103.11days) was counted in treatment T_7 whereas, treatment T_8 observed with maximum number of days to first colour shown (111.44 days). Initiation in the best treatment is due to application of FYM increases the concentration of phosphorus and potassium due to 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 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_2 whereas, treatment T_0 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_6 while, treatment T_0 shows minimum duration of flowering (5.03 days). The beneficial effect of INM of earliness of spike emergence could be attributed to the good vegetative and reproductive growth of plant which in turn resulted in early floret opening [12].

The cormel parameters are cited in table 1. The more number of cormels/corm (8.51) were counted in treatment T_3 whereas, treatment T_9 was recorded with minimum number of cormel/corm (7.11). Treatment T_6 resulted maximum

weight of individual cormel (0. 45 g) and minimum weight of individual cormel (0.38 g) was obtained with treatment T_0. The maximum weight of cormel/corm (3.04 g) was resulted in treatment T_5 whereas, treatment T_1 (control) was recorded with minimum weight of cormel/corm (3.02 g). Better cormels production might be due to 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 storage of carbohydrates and nitrogen compounds in the corms. Sufficient N and P continuously maintain vegetative growth leading to increase in photosynthetic area, resulting in more accumulation of assimilates and partitioning to the developing corms and cormels. This may be due to ability of organic manure and bio fertilizers to produce growth promoting substances such as IAA and gibberellins like substances viz., vitamins and riboflavin's etc. which might have helped in increasing 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_5 and treatment T_3 was recorded with minimum cormel diameter (0.43 cm). Increase in average diameter and weight of corms and cormels due to application of biofertilizers might be due to fact that it increased nutrients availability to the plants, which increases photosynthetic activity of the plants and thereby, hastening 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 its consortium was observed on 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 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 highly positive effect on number of leaves/plant, weight of individual cormel (g), weight of cormels/corm (g) and cormel diameter (cm).

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Table 1. Responce 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/ corm	Weight of individual cormel (g)	Weight of cormels /corm (g)	Cormel diameter (cm)
T_0	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_1	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_2	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_3	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_4	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_5	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_6	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_7	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_8	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_9	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