The Pharma Innovation Journal 2021; 10(12): 428-431

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(12): 428-431

www.thepharmajournal.com
Received: 14-09-2021
Accepted: 27-11-2021

Mohit Chaudhary
Department of Horticulture, Sardar Vallabh Bhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh, India

Sunil Malik
Department of Horticulture, Sardar Vallabh Bhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh, India

Mukesh Kumar
Department of Horticulture, Sardar Vallabh Bhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh, India

Vimal Chaudhary
Assistant Professor, Lovely Professional University, Phagwara, Punjab, India

Rohan Tomar
Department of Floriculture and Landscaping, College of horticulture, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal, Uttarakhand, India

Corresponding Author:
Mohit Chaudhary
Department of Horticulture, Sardar Vallabh Bhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh, India

Effect of organic and chemical fertilizers on vegetative and quality parameters of gladiolus (*Gladiolus grandiflorus* L.)

Mohit Chaudhary, Sunil Malik, Mukesh Kumar, Vimal Chaudhary and Rohan Tomar

Abstract
To the field experiments were conducting on "Effect of organic and Chemical Fertilizers on Vegetative and Quality Parameters of Gladiolus (*Gladiolus grandiflorus* L.)", during 2018-19 and 2019-20 at Horticultural Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut. Fourteen different treatments comprising the application of chemical fertilizers and biofertilizers on this experiment. The results obtained in the present study are summarized as minimum days to 50% sprouting were taken with treatment T_{10} (75% RDF + 25% Vermicompost + *Azospirillum*+ PSB), highest plant height at 30, 60, 90 and 120 DAS were recorded in treatment T_{10}(75% RDF + 25% Vermicompost + *Azospirillum* + PSB), maximum number of leaves per plant at 30, 60, 90 and 120 DAS were noted in treatment T_{10}(75% RDF + 25% Vermicompost + *Azospirillum* + PSB), highest length of longest leaf at 30, 60, 90 and 120 DAS were measured in treatment T_{10}(75% RDF + 25% Vermicompost + *Azospirillum*+ PSB), Width of longest leaf at 30, 60, 90 and 120 DAS were noted higher when plants were grown with treatment T_{10}(75% RDF + 25% Vermicompost + *Azospirillum*+ PSB), The minimum days taken to opening of florets were earliest in T_{10}(75% RDF + 25% Vermicompost + *Azospirillum* + PSB) and maximum number of flowers per plant were observed with the application of T_{10}(75% RDF + 25% Vermicompost + *Azospirillum* + PSB).

Keywords: Organic, chemical, fertilizers, parameters, gladiolus, *Gladiolus grandiflorus* L.

Introduction
Gladiolus is an important commercial flower crop and is very popular as cut flower both in domestic and international market. It is also called as 'Queen of bulbous plant'. The shape of the leaf which resembles that of sword (Latin word *gladius* meaning sword). The flowers are used in flower arrangement, in bouquets and for indoor decorations. In India gladiolus is commercially grown in West Bengal, Maharashtra, Uttar Pradesh, Uttarakhand, Punjab, Haryana, Sikkim, Jammu and Kashmir, Karnataka, Gujarat, Himachal Pradesh, Tamil Nadu, Madhya Pradesh, Delhi and Rajasthan (Anonymous, 2019). Gladiolus is tender herbaceous perennial and it is commercially propagated by corms having size 4.0 to 4.5 cm. Cormels are important source for increasing the number of good quality planting material. Cormels between 1 cm and less than 2.5 cm diameter are grown for production of flowering stock. The corm is covered by 4-6 dry scales or husks whose bases are of the older leaves formed during previous growing season. Leaves are sword shaped, clustering at the stem base. Flowers are two whorled having six perianth segments attached with a funnel shaped cup and are trimerous. Today, the production of crops is constant or moving towards reduction while nitrogen, phosphorus and potash are using as per requirement of plants through inorganic fertilizers. Generally, farmers apply nitrogen, phosphorus and potash for increasing production of crops. Often, they do not apply micronutrients which can be easily available through application of organic manures. The chemical fertilizers are mostly used in gladiolus cultivation because of quick release of essential element to the crop, which have some deleterious effect on flower quality besides adverse effect on soil health, water and environment (Rathore *et al.*, 2010). Application of farmyard manure was found to be beneficial for plant growth, flowering and corm yield parameters and considered best for growing a successful crop (Gupta *et al.*, 2008). Vermi-composts also act as chelating agent besides being a rich source of micronutrients and regulate the availability of metabolic micronutrients like iron and zinc in the plants. Use of neem cake seems to make soil more fertile due to the presence of an important ingredient that blocks soil bacteria from converting nitrogenous compounds into nitrogen gas as suggested by some research findings.

Material and Methods

The present investigation was carried out on Vegetative Parameters of Gladiolus (*Gladiolus grandiflorus* L.)" var; White prosperity during Rabi season of 2018-2019 and 2019-2020 at the Horticultural Research Centre of Sardar Vallabh Bhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh. Before laying out the experiment, soil samples (0-15 cm depth) were collected randomly from the experimental field and the composite sample was prepared and it was finally analyzed in the laboratory for determining the physicochemical properties of soil. The standard method was applied and result obtained for important physicochemical characteristics of the soil of the experimental area. Total number of 14 treatments was comprised during course of investigation including, Control (T1),300 Kg N + 200 Kg P2O5 + 200 KgK2O/ha (RDF) (T2), RDF + 25% FYM(T3), RDF + 25% Vermicompost(T4), 75% RDF + 25% FYM(T5), 75% RDF + 25% Vermicompost(T6), 75% RDF + 25% FYM + Azospirillum(T7), 75% RDF + 25% Vermicompost + Azospirillum(T8), 75% RDF + 25% FYM + Azospirillum + PSB(T9), 75% RDF + 25% Vermicompost + Azospirillum + PSB(T10)RDF + ZnSO4 (0.3%)(T11), RDF + FeSO4 (0.4%)(T12), RDF + ZnSO4 + Azotobacter + PSB(T13), RDF + FeSO4 + Azotobacter + PSB(T14). The experiment was laid out in Randomized Block Design with three replications. Each replication consists of 14 treatment combinations.

Result and Discussion

Growth and qualitative Parameter

The application of 75% RDF + 25% Vermi-compost + *Azospirillum* + PSB) resulted in maximum average plant height *i.e.*, 48.18, 61.21, 69.11 and 72.36 cm were recorded at 30, 60, 90 and 120 days after sowing. The minimum plant height *viz*. 37.98, 51.24, 55.65 and 58.62 cm was recorded in control at 30, 60, 90 and 120 DAS, in current investigation. The presence and synthesis of gibberellins in vermin-compost attributed to enhance the plant height. Gibberellins cause both cell-elongation and cell-division that stimulates elongation which eventually resulted in increase in plant height. The positive effect of Vermi-compost on plant growth has been reported in gladiolus by Singh *et al.*, (2013) [15] and Singh *et al.*, (2014) [16]. In the present study, the maximum average number of leaves per plant, 5.89, 8.36, 9.86 and 11.28, was recorded with T_{10} (75% RDF + 25% Vermi-compost + *Azospirillum* + PSB), whereas, minimum number of leaves, 3.21, 4.39, 5.86 and 6.86 was observed in treatment T_1 (control) during 2018-19 and 2019-20, respectively. The findings of the present investigation are also in the agreement with the findings of Singh *et al.*, (2013) [15], Kumar (2014) [5] and Baruati *et al.*, (2018) [2]. The maximum average length of leaf, 43.55, 51.31, 54.67, 57.04cm at 30, 60, 90 and 120 days after sowing was reported with treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB) and minimum length of longest leaf (35.18, 41.18, 43.76, 46.81 cm) at 30, 60, 90 and 120 days after sowing was measured with treatment T_1 (control) of experimentation. These findings are in line with Singh *et al.*, (2013) [15], Kumar (2014) [5], and Prakash *et al.*, (2015) [12]. The maximum average width of the longest leaf (1.12, 1.85, 2.34 and 2.58 cm) at 30, 60, 90 and 120 days after sowing was obtained with treatment T_{10} (75% RDF + 25% Vermi-compost + *Azospirillum* + PSB), whereas, minimum average width of leaf, 0.66, 0.95, 1.22 and 1.50 cm at 30, 60, 90 and 120 days after sowing was noted with treatment T_1 (control) during 2018-19 and 2019-20 respectively. These results are in partially supported by the findings of Pradeep *et al.*, (2014) [11], Ahmed *et al.*, (2015) [1] and Jha *et al.*, (2020) [3]. Table 4.18 and Fig. 4.18 which revealed that minimum days taken for initiation of first spike was 40.67 and 41.00 days under the effect of treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB) and the maximum 51.67 and 52.33 days taken for opening of first spike was recorded in T_1(control) during investigation. These findings are in line with Kumari *et al.*, (2013) [8], Kumar *et al.*, (2017) [7] and Mageswari N. *et al.*, (2017) [9]. Table 4.19 and Fig. 4.19 which showed that minimum days taken for opening of florets was 49.00 and 50.24 days under the effect of treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB) and the maximum 60.00 and 61.42 days were recorded in treatment T_1 (control) during both the years of investigation. These findings are in line with Zubair *et al.*, (2006) [19] and Baruati *et al.*, (2018) [2]. The maximum number of flowers per plant in gladiolus was 13.67 and 13.84 obtained under the treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB). The minimum number of flowers per plant (8.33 and 9.03) was detected under treatment T_1 (control). The similar results were reported by Wasim *et al.*, (2014) [18], Kumar *et al.*, (2016) [6] and Satapathy *et al.*, (2016) [13]. Maximum flower diameter *i.e.*, 10.22 cm and 10.35 cm reported in T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB). The minimum flower diameter (7.12 cm and 7.36 cm) was reported under treatment T_1 (control) during the years 2018-19 and 2019-20. Singh *et al.*, (2013) [15], Kumari *et al.*, (2014) [5] and Singh *et al.*, (2014) [16]. Higher rachis length *i.e.*, 41.78 cm and 42.20 cm were reported in T_{10} (75% RDF + 25% Vermi-compost + *Azospirillum* + PSB), while minimum rachis length (31.36 cm and 32.35 cm) were observed in treatment T_1 (control) during both the seasons of investigation. This increment in rachis length might be due to the cell-elongation by the presence of nitrogenous compounds, it has also been reported by Pradeep *et al.*, (2014) [11], Tahmina *et al.*, (2014) [17] and Pansuriya and Chauhan (2015) [10]. The data presented in Table 4.23 and Fig. 4.23 revealed that maximum spike length *i.e.*, 119.68 cm and 122.74 cm resulted in the treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB). While the minimum spike length (98.75 cm and 101.27 cm) was observed with control treatment during both the seasons. Similar findings were observed by Kumari *et al.*, (2013) [8], and Mageswari N. *et al.*, (2017) [9]. In Table 4.24 and Fig. 4.24 which showed that maximum spike diameter *viz*. 1.083 cm and 1.142 cm resulted in the treatment T_{10} (75%RDF + 25% Vermi-compost + *Azospirillum* + PSB). Whereas the minimum diameter of spike 0.627 cm and 0.634 cm was observed with control treatment during both the seasons. The present findings are also in line of Shadanpour *et al.*, (2011) [14] in marigold. In Table 4.25 and Fig. 4.25 that the longevity of spike was significantly increased the maximum longevity days of spike (23.33 and 24.66 days) was recorded under treatment T_{10} (75% RDF + 25% Vermi-compost + *Azospirillum* + PSB), while the minimum days for longevity of spike ((17.00 and 17.33 days) was showed under treatment T_1 (control). Kumar (2014) [5], Singh *et al.*, (2014) [16] and Pansuriya and Chauhan (2015) [10].

Table 1: Effect of organic and chemical fertilizers on vegetative parameters of Gladiolus

Notation	Plant height (cm)				Number of leaves per plant				Length of longest leaf (cm)				Width of longest leaf (cm)			
	30	60	90	120	30	60	90	120	30	60	90	120	30	60	90	120
T_1	37.98	51.24	55.65	58.62	3.21	4.39	5.86	6.86	35.18	41.18	43.76	46.81	0.66	0.95	1.22	1.50
T_2	42.03	54.81	59.77	61.71	3.73	5.50	6.78	7.27	36.49	43.64	45.93	48.85	0.81	1.35	1.58	1.84
T_3	42.62	54.29	58.96	61.00	4.11	5.73	7.43	8.50	37.90	44.41	46.87	49.94	0.86	1.35	1.64	2.16
T_4	43.10	54.99	60.59	62.97	4.20	5.44	7.11	8.56	37.10	44.81	46.88	50.32	0.84	1.30	1.76	2.21
T_5	44.16	56.21	60.85	65.46	4.06	5.54	7.40	8.59	36.89	44.94	47.00	50.24	0.90	1.26	1.80	2.22
T_6	43.23	55.40	60.32	63.56	4.10	5.84	7.83	8.39	38.15	45.46	47.77	50.62	0.83	1.26	1.75	2.19
T_7	45.16	56.58	63.60	65.27	4.39	6.46	7.51	8.11	37.39	45.15	47.84	50.29	0.86	1.29	2.08	2.36
T_8	45.22	57.51	64.51	63.67	4.47	6.47	6.78	8.91	38.53	46.07	48.67	51.42	0.95	1.18	1.86	2.39
T_9	45.98	58.67	65.68	67.00	4.84	6.53	7.50	9.10	38.56	45.90	48.85	51.76	0.88	1.22	1.82	2.26
T_{10}	48.18	61.21	69.11	72.36	5.89	8.36	9.86	11.28	43.55	51.31	54.67	57.04	1.12	1.85	2.34	2.58
T_{11}	46.14	55.82	59.33	63.84	4.13	5.67	7.71	9.39	38.20	46.22	48.88	51.83	0.86	1.60	2.18	2.38
T_{12}	43.22	54.78	59.60	63.08	4.74	5.84	7.11	9.23	37.89	45.13	47.58	50.73	0.95	1.47	1.94	2.47
T_{13}	45.29	56.78	62.51	66.33	5.49	7.12	8.89	10.71	39.57	47.59	50.52	53.51	0.98	1.63	2.22	2.50
T_{14}	45.39	56.93	64.48	68.59	5.13	6.39	8.50	10.09	39.19	46.89	49.50	52.11	0.97	1.77	1.83	2.49

Table 2: Effect of organic and chemical fertilizers on quality parameters of Gladiolus

Notation	Days taken for opening of first spike	Days taken to opening of florets	Number of flowers per plant	Diameter of flower (cm)	Length of rachis (cm)	Length of spike (cm)	Diameter of spike (cm)	Longevity of spike (days)
T_1	52.00	60.71	8.68	7.24	31.80	100.01	0.631	17.17
T_2	51.17	58.72	9.72	8.32	34.94	104.51	0.733	18.67
T_3	50.50	58.67	10.17	8.42	35.50	109.35	0.817	18.84
T_4	48.83	57.19	10.89	9.42	37.17	110.18	0.862	19.37
T_5	48.43	57.21	11.34	9.54	38.82	112.34	0.948	21.00
T_6	46.50	57.00	11.67	9.02	37.89	115.17	0.889	19.83
T_7	47.73	56.50	12.34	9.42	37.85	115.45	0.856	21.00
T_8	44.15	52.75	10.54	8.80	39.11	117.25	0.773	21.67
T_9	43.98	51.87	12.76	9.59	39.29	116.42	0.943	21.00
T_{10}	40.83	49.62	13.76	10.29	41.99	121.21	1.113	24.00
T_{11}	42.68	51.29	11.89	9.30	37.85	114.06	0.879	19.17
T_{12}	44.56	51.83	11.67	9.01	37.75	113.92	0.851	18.72
T_{13}	42.51	50.67	13.44	10.20	40.14	117.24	1.068	22.87
T_{14}	43.67	51.17	12.28	9.21	38.95	116.64	1.000	21.67

Conclusion

Based upon the results recorded in the investigation it could be concluded that the treatment T_{10}(75% RDF + 25% Vermicompost + *Azospirillum* + PSB), was found best treatment with reference to vegetative, nutritional, and productive parameters in gladiolus cv. White Prosperity as compared to control and other treatments. The availability of nutrient and B:C ratio were also giving the noteworthy results with an application of (T_{10}) – (75% RDF + 25% Vermicompost + *Azospirillum* + PSB), followed by treatment T_{13}-(RDF + $ZnSO_4$+ Azotobacter + PSB) with assessment under control and other treatments during both the years of investigation. Therefore, it is recommended that an application of chemical fertilizers, organic manure, micronutrients and biofertilizers in combination *i.e.,* treatment (T_{10}) – (75% RDF + 25% Vermicompost + *Azospirillum* + PSB) may be recommended for obtaining the maximum yield and quality also.

References

1. Ahmed S, Sultana S, Kawochar AMD, Naznin S, Tuli FU. Effect of corm size and nitrogen on the growth and flowering of gladiolus (*gladiolus grandiflorus* L.) Emer Life Science Research 2015;1(1):18-25.
2. Baruati D, Talukdar MC, Vikash Kumar. Effect of organic manures and biofertilizers on growth and yield of gladiolus (*gladiolus grandiflorus* L.) International Journal of Chemical Studies 2018;6(5):2529-2532.
3. Jha S, Kaushik M, Parihar BS, Sinha PK. Effect of different component of integrated nutrient management on growth, yield and quality of gladiolus (*Gladiolus grandiflorus* L.) cv. Candyman. Journal of Pharmacognosy and Phytochemistry 2020;9(3):831-833.
4. Khalaj MA, Edrisi B, Amiri M. Effect of nitrogen and plant spacing on nutrients uptake, yield and growth of tuberose (*Polianthes tuberosa* L.). Journal of Ornamental and horticultural Plants 2012;2(1):45-54. ISSN- 2251-6441.
5. Kumar M. Effect of different sources of nutrients on growth and flowering in gladiolus (*Gladiolus hybridus hort*.) cv. Peter Pears. Annals of Horticulture 2014;7(2):154-158.
6. Kumar K, Singh CN, Beniwal VS, Pinder R. Effect of spacing on growth, flowering and corm production of gladiolus (*Gladiolus sp*.) cv. American Beauty. International Journal of Environment, Agriculture and Biotechnology 2016;1(3):550-554. ISSN: 2456-1878.
7. Kumar K, Singh CN, Beniwal VS, Pinder R, Poonia R. Effect of nitrogen fertilizer on different attributes of gladiolus (*Gladiolus grandiflorus* L.) cv. American Beauty. International Journal of Environment, Agriculture and Biotechnology 2017;2(1):1-3. ISSN: 2456-1878.
8. Kumari VR, Kumar DP, Mahadevamma M, Arunkumar B. Effect of integrated nutrient management on growth and floral parameters in gladiolus (*Gladiolus hybridus* L.) cv. American Beauty. The Asian Journal of Horticulture 2013;8(1):274-279.

9. Mageswari N, Sankari A, Kayalvizhi K, Arulmozhiyan R. Effect of integrated nutrient management on gladiolus cv. Novalux (*Gladiolus hortulanus* L.) under shevaroy condition. International Journal of Agriculture Sciences 2017;9(48):4822-4825. ISSN: 0975-3710 & E-ISSN: 0975-9107.
10. Pansuriya PB, Chauhan RV. Effect of integrated nutrient management on growth, yield and quality of gladiolus (*Gladiolus grandiflorus* L.) Cv. Psittacinus hybrid. Journal of Horticulture 2015, 2(2). ISSN:2376-0354.
11. Pradeep K, Manivannan K, Kumar SR. Effect of organic nutrients on growth, flowering and yield of (*Gladiolus grandiflorus* L.). The Asian Journal of Horticulture 2014;9(2):416-420.
12. Prakash S, Kushwahsa IK, Singh M, Shahi BP. Effect of vermicompost and biocontrol agents on growth and flowering of gladiolus c.v. Pusa Kiran. Annals of Horticulture 2015;8(1):110-112.
13. Satapathy SP, Toppo R, Dishri M, Mohanty CR. Impact of integrated nutrient management (INM) on flowering and corm production in gladiolus. Biometrics & Biostatistics International Journal 2016;4(7):296-298.
14. Shadanpour F, Torkashvand MA, Majd KH. The effect of cow manure vermicompost as the planting medium onthe growth of marigold. Annals of Biological Research 2011;2(6):109-115. ISSN 0976-1233.
15. Singh R, Kumar M, Raj S, Kumar S. Effect of integrated nutrient management on growth and flowering in gladiolus (*Gladiolus grandiflorus* L.) cv. White Prosperity. Annals of Horticulture 2013;6(2):242-251.
16. Singh R, Kumar M, Raj S, Kumar S. Flowering and corm production in gladiolus (*Gladiolus grandiflorus* L.) cv. White Prosperity as influenced by integrated nutrient management (INM). Annals of Horticulture 2014;7(1):36-42.
17. Tahmina S, Amin MR, Joya MFJ, Mehraj H, Jamal Uddin AFM. Evaluate the corm size on growth, flowering and corm cormel yield of gladiolus (*Gladiolus grandiflorus*) International Journal of Business, Social and Scientific Research 2014:2(1):64-67. ISSN: 2309-7892.
18. Wasim M, Gupta NK, Dubey S, Mohanty A. Effect of inorganic fertilizers in combination with bio-fertilizers on growth and yield of tuberose (*Polianthes tuberosa*). Indian Horticulture Journal 2014;4(1):37-42. ISSN: 2249-6823.
19. Zubair M, Ayub G, Wazir FK, Khan M, Mahmood Z. Effect of potassium on pre flowering growth of gladiolus cultivars. Journal of Agricultural and Biological Science 2006;1(3):36-46. ISSN: 1990-6145.