Effect of organic manure and inorganic fertilizers on Plant growth and Spike yield of Gladiolus (*Gladiolus grandiflora*) C.V. Plumtart.

Madhur Kumar■ and Devi Singh♦

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ABSTRACT

The present investigation entitled "Effect of organic manure and inorganic fertilizers on plant growth and spike yield of gladiolus (*Gladiolus grandiflora*) c.v. Plumtart", was undertaken at Department of Horticulture, during the year 2013-14. The experiment was laid out in randomized block design with 13 treatments replicated thrice. The treatments comprised of FYM, vermicompost and poultry manure with 25% RDF, 50% RDF and 75% RDF in different combinations including control (RDF- N: P: K 100:120:80 kg/ha). The results revealed that application of 75% RDF + 25% vermicompost (T_{11}) produced significantly maximum plant height (105.60 cm), number of leaves per plant (8.07), number of shoots per corm (2.47), earliest in days of spike initiation (53.33) and days for opening of first florets (71.00) and maximum in number of florets per spike (19.08), floret diameter (9.10 cm), spike length (93.37 cm), first floret durability (9.30 days) and also yield parameters likenumber of spike per plant (2.87),number of spike per hectare (140848.84),number of corms per plant (3.20),number of corms per hectare (241482.28)as compared to control (T_0), and in economic point of view treatment T_{11} (75% RDF + 25% vermicompost) was found to be most economically viable in terms of gross return (6,94,236), net return (3,87,710) and benefit cost ratio (2.26 :1).

Key words : *FYM, (Gladiolusgrandiflora), Plumtart, Poultry manure,RDF, Vermicompost,*

INTRODUCTION

Gladiolus derived from the Latin word "gladius" meaning a sword shape likes leaves of the plants. It belongs to family Iridaceae and native from Cape region in South Africa. It is also known as the queen of bulbous ornamental with majestic cut spikes having florets of massive form, brilliant colors, attractive shapes, varying sizes and excellent keeping quality. It is excellent for beds, rockeries, pots, herbaceous boarders and cut flowers. Gladiolus can be cultivated on all types of soil having good soil texture and drainage facility. The soil pH ranges from 6.0 to 7.0 is ideal for growth and development of cut spike production. It is a winter season crop but can be grown during rainy season in low rainfall areas with mild climate. The increase in cut flower production and quality cut spikes can be achieved by adopting suitable dose of Organic manure and Inorganic fertilizer. So far scanty research work has been done on suitable and balanced dose of Organic manure and Inorganic fertilizerrequirement on gladiolus under subtropical condition. Hence, present investigation was undertaken during the year 2013-2014 during rabi season with a view to find out the effect of organic manure and inorganic fertilizer application in gladiolus. cv. Plumtart for growth and flowering. The yield and quality of flowers and corms can be improved by adopting integrated nutrient management practices which include the judicious and combined use of organic, inorganic **(Singh *et al.*, 2006)**. The success of gladiolus cultivation depends upon many factors like soil fertility, irrigation, planting time, planting density, plant protection measures, plant growth regulators and some chemicals etc., these may play major role towards increasing production and quality of gladiolus. Processes **(Bhalla *et al.*, 2006)**.

METHODS AND MATERIALS

The present investigation was carried out at Horticulture research farm, Department of Horticulture, Allahabad school of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (U.P) The treatment comprised o 12 different dose of organic manure and inorganicfertilizers. The experiment was laid out in a Randomized Block Design with 12 treatments and T_0 as control with thrice replication.The planting was done on 2 Nov. 2014 at spacingof 30×30. The observations were recorded on 17 character viz. Plant height (cm), Number of leaves per Plant,Number of shoots per corm, Days of spike initiation, Days for opening of first flower, size of florets, spike length, number of florets per spike, first floret durability, number of spike per plant, Number of spike per hectare,number of corms per plant,number of corms per hectare, cost of cultivation, gross income, net income and benefit cost ratio. Data were statistically analyzed for the study of different treatments.

RESULTS AND DISCUSSION

Data for various parameters, viz.and days taken for corm sprouting, plant height (30, 60 and 90 DAP), and numbers of leaves plant-1 (30, 60 and 90 DAP), leaf area per plant is presented in *Table 1* and the results are discussed under following sub heads:

Plant heights were significantly increased by differentdoses oforganic and inorganic nutrients at all successive stages of growth. 75% RDF + 25% Vermicompost produced maximum plant height (105.60 cm) followed by (100.40 cm) with 75% RDF + 25% FY4. The minimum plant height (85.10 cm) was observed with control. Similarly observation were recording by **(Swaroop and Janakiram, 2010)**

■M.sc. Student, ♦Assistant Professor
Dept. of Horticulture, Allahabad School of Agriculture,
Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad - 211007 (U.P.)

The maximum number of leaves (8.07) were recorded with 75% RDF + 25% Vermicompost followed by (7.87) with 75% RDF + 25% FYM. Minimum number of leaves (6.13) per plant was noticed in control.

The maximum number of shoots (2.47) were recorded with 75% RDF + 25% Vermicompost followed by (2.20) with 75% RDF + 25% FYM. Minimum number of shoots (1.07) per plant was noticed by control.

The maximum days to first spike initiation (72.00) were recorded with control followed by (70.67) with 25% RDF. Minimum days to first spike initiation (53.33) with 75% RDF+25% Vermicompost.

The Maximum days taken to opening of first floret (91.67) were noticed in control followed by (88.00) with 25% RDF. Minimum days taken to opening of first floret (71.00) were recorded in 75% RDF+ 25% Vermicompost. Similarly observation were recording by **(Narendra *et al.*, 2013)**

Length of spike was significantly increased by different doses of organic and inorganic fertilizers at all the successive stages of growth. The maximum length of spike (94.67) was noticed in 50% RDF + 50% Poultry manure followed by (91.07) with 75% RDF + 25% Poultry manure. The minimum length of the spike (69.53) was recorded in control.

Numbers of florets per spike were significantly by different levels of organic and inorganic fertilizers. Maximum number of florets per spike (18.07) was recorded with 50% RDF + 50% Poultry manure followed by (17.53) was recorded with 50% RDF + 50% Vermicompost. Minimum was recorded in control (13.80). Similarly observation were recording by **(Swaroop and Janakiram, 2010)**

Maximum number of spikes per plant (2.47) was recorded in 50% RDF + 50% Poultry manure followed by (2.20) was recorded with 50% RDF + 50% Vermicompost minimum (1.13) was recorded in control.

Spike yield per hectare were significantly by different level of organic and inorganic fertilizers. Maximum yield of spike per hectare (225925) was recorded in 50% RDF + 50% Poultry manure followed by (218518) was recorded with 50% RDF + 50% Vermicompost minimum (125925) was recorded in control.

Numbers of corms per plant were significantly increased by different level of organic and inorganic fertilizers. Maximum number of corm per plant (2.30) was recorded in 50% RDF + 50% Poultry manure followed by (2.17) was recorded with 50% RDF + 50% Vermicompost minimum (1.07) was recorded in control.

Corm yield per hectare were significantly by different level of organic and inorganic fertilizers. Maximum no. corms per hectare (255555) was recorded in 50% RDF + 50% Poultry manure followed by (240740) was recorded with 50% RDF + 50% Vermicompost minimum (118518) was recorded in control. Similarly observation were recording by **(Swaroop and Janakiram, 2010)**

Spike floret diameter was significantly increased by different levels of organic and inorganic fertilizers. The maximum spike floret diameter (9.75 cm) was noticed in 50% RDF + 50% Poultry followed by (9.37 cm) with 50% RDF + 50% Vermicompost. The minimum spike floret diameter (7.22 cm) was recorded in control.

The average number of Cormlets per plant in each treatment was significantly higher than control different doses oforganic manure and inorganic fertilizer. The maximum number of cormlets per plant (26.70) was recorded under the treatment (T_5) with 50% RDF + 50% Poultry manure followed by (25.98) T_4 with 50% RDF + 50% Vermicompost and minimum (15.47) was observed under the control (T_0).

CONCLUSION

On the present investigation conducted in Gladiolus, it is concluded that with application of 50% RDF along with 50% poultry manure (T_5) gave maximum plant height (105.13 cm) and highest spike yield (225925 no./ha). The application of 50% RDF + 50% poultry manure (T_5) was effective for enhancing corms (255555 no. /ha.) and corm lets (26.7 per plant) production in gladiolus. The treatment T_5 (50% RDF + 50% poultry manure) was

Table -1 Effect of organic and inorganic nutrients vegetative growth of gladiolus.

Treatments	Plant height			No. of leaves per plant			No. of shoots per corm
	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP	
Control	23.77	48.21	84.10	3.10	4.93	6.13	1.07
25% RDF	25.49	51.10	86.40	3.27	5.20	6.33	1.13
25% RDF + 75% FYM	31.47	57.83	91.27	3.73	6.00	6.87	1.47
25% RDF + 75% vermicompost	32.19	58.61	92.80	3.80	6.07	6.93	1.53
25% RDF + 75% Poultry manure	30.65	56.53	90.53	3.53	5.93	6.67	1.40
50% RDF	29.14	54.49	88.70	3.33	5.40	6.47	1.20
50% RDF + 50% FYM	34.35	60.76	95.33	4.13	6.40	7.13	1.80
50% RDF + 50% vermicompost	35.71	62.60	97.27	4.20	6.53	7.27	1.93
50% RDF + 50% Poultry manure	33.47	59.11	94.73	4.00	6.27	7.00	1.60
75% RDF	30.25	55.67	89.53	3.40	5.73	6.53	1.33
75% RDF + 25% FYM	38.61	64.85	100.40	5.00	6.93	7.87	2.20
75% RDF + 25% vermicompost	40.53	65.41	105.60	5.33	7.20	8.07	2.47
75% RDF + 25% Poultry manure	36.60	63.13	99.07	4.33	6.80	7.40	2.00
F- test	S	S	S	S	S	S	S
SEd ±	2.277	2.043	2.285	0.307	0.357	0.320	0.244
CD (5%)	4.699	4.218	4.717	0.633	0.737	0.660	0.504

Table - 2 Effect of organic and inorganic nutrients flowering of gladiolus.

Treatments	Day of spike initiation	Day for opening of first florets	Diameter of the florets (cm)	Length of Spikes (cm)	No. of florets/spike	First floret durability
Control	72.00	91.67	7.04	69.36	14.03	6.63
25% RDF	70.67	88.00	7.27	72.70	14.79	7.09
25% RDF + 75% FYM	65.00	82.67	7.96	80.03	16.49	7.82
25% RDF + 75% vermicompost	64.00	82.33	8.08	82.03	16.71	7.93
25% RDF + 75% Poultry manure	67.67	83.00	7.75	79.03	16.31	7.63
50% RDF	69.00	87.33	7.38	74.70	15.50	7.20
50% RDF + 50% FYM	61.67	79.00	8.18	85.70	17.48	8.28
50% RDF + 50% vermicompost	60.33	78.00	8.22	87.70	17.63	8.50
50% RDF + 50% Poultry manure	63.00	80.33	8.10	83.03	17.04	8.08
75% RDF	68.33	85.33	7.44	78.36	15.88	7.33
75% RDF + 25% FYM	55.33	73.00	8.72	91.70	18.50	9.05
75% RDF + 25% vermicompost	53.33	71.00	9.10	93.37	19.08	9.30
75% RDF + 25% Poultry manure	58.00	75.00	8.32	90.37	18.07	8.97
F- test	S	S	S	S	S	S
S.Ed ±	2.383	2.285	0.504	2.366	0.576	0.527
CD (5%)	4.919	4.716	1.039	4.884	1.189	1.087

Table - 3 Effect of organic and inorganic nutrients on yield attributes of gladiolus.

Treatments	No. of spike per plant	No. of spike per hectare	No. of corms per plant	No. of corms per hectare
Control	1.07	112281.48	1.13	191281.07
25% RDF	1.13	113664.48	1.27	193534.25
25% RDF + 75% FYM	1.47	121048.10	1.67	203049.18
25% RDF + 75% vermicompost	1.53	123443.97	1.80	204338.07
25% RDF + 75% Poultry manure	1.40	122639.27	1.53	202583.84
50% RDF	1.20	113851.15	1.33	195241.32
50% RDF + 50% FYM	1.93	124572.92	2.07	206454.32
50% RDF + 50% vermicompost	2.00	124668.02	2.27	209710.23
50% RDF + 50% Poultry manure	1.73	123832.15	1.93	205021.25
75% RDF	1.33	115649.48	1.40	201530.43
75% RDF + 25% FYM	2.33	138963.48	2.80	224138.57
75% RDF + 25% vermicompost	2.87	140848.84	3.20	241482.28
75% RDF + 25% Poultry manure	2.07	134896.70	2.53	217430.44
F- test	S	S	S	S
SEd ±	0.327	2.338	0.258	2.345
CD (5%)	0.674	4.825	0.532	4.839

found to be most economically viable in terms of gross return (8, 49,998), net return (5, 44,687) and benefit cost ratio (2.78:1). As the study was undertaken only for winter season, it needs further confirmation by conducting more trails.

REFERENCES

Barman, D., Rajni, K., Rampal and Upadhyaya, R.C. (2005). Corm multiplication of gladiolus as influenced by application of potassium and spike removal. *J. Orna. Hort.,* **8** (2):104-107.

Bhalla, R., Priyanka, K., Dhiman, S.R. and Jain, R. (2006). Effect of bio-fertilizers and bio-stimulants on growth and flowering in gladiolus. *J. Orna. Hort.*, **9**(4):248-252.

Dr. G.S. Ranthawa & Dr. Amitabha Mukhopadhyay (Floriculture in india), 1986 : 76 - 78.

Narendra Chaudhary, Kishan Swaroop, Janakiram, T., Biswas, D.R., and Geeta Singh, (2013). Effect of integrated nutrient management on vegetative growth and flowering characters of gladiolus. *Indian J. Hort.* **70**(1), March 2013: 156-159.

Singh, P. V., Kumar, V. and Kumar, R. (2006). Effect of organic manures and inorganic fertilizers on flowering of gladiolus cv. American Beauty. "National Symposium on Ornamental Bulbous Crops". Held on 5-6 December, 2006 at S.V.B.P.U. of Ag. & T., Modipuram, Meerut (U.P.) : 110 - 111.

Swaroop, K. and Janakiram, T. (2010). Response of Bio fertilizers, FYM and their combined application with different levels of inorganic fertilizers in gladiolus (*Gladiolus hybridus* L.). *International Journal of Tropical Agriculture*, **28** (3-4): 435-438.