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Effect of organic and inorganic fertilizers on growth and flower quality of gladiolus cv. H.B. PITT

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ABSTRACT : An investigation was undertaken at Department of Horticulture, Late Vasantrao Naik Marathwada Agricultural University, Parbhani during *Kharif* season 2008-09 to analyze the effect of organic and inorganic fertilizers on growth and flower quality of gladiolus cv. H.B. PITT. In the present study, it was found that the maximum height of the plant (60.19 cm), number of leaves (16.93), fresh weight of plant (274.94 g) and dry weight of plant (53.23g) were recorded by the treatment 50 % RDF + 50 % vermicompost to the experimental plot. Minimum plant height (51.67 cm), number of leaves (13.17), fresh weight of plant (179.79 g) and dry weight of plant (31.15 g) were recorded in the treatment 25 % RDF + 75 % FYM. Maximum length of spike (80.28 cm), length of rachis (41.50 cm) and spike (2.60 cm) were recorded in the treatment 50 % RDF + 50 % vermicompost to the experimental plot. Lowest spike length (72.50 cm), rachis length (35.09 cm) and diameter of spike (1.90 cm) were recorded in the treatment 25 % RDF + 75 % FYM. Thus, on the basis of present study, it can be concluded that the gladiolus crop should be provided the nutrition in the form of 50 % RDF + 50 % vermicompost per hectare for obtaining better plant growth and flower quality.

KEY WORDS : Organic, Inorganic fertilizers, Growth, Flower quality, Gladiolus

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Gladiolus (*Gladiolus grandiflora* L.) commonly called sword Lilly or corn flag is the seventh most important flowers of the world. Gladiolus is a native of South Africa belonging to family Iridaceae. Internationally it is known for its dazzling florets colour, sturdy spike, size, attractive appearance and keeping quality and occupies fifth position in the international trade. In India, gladiolus occupied about 0.05 per cent of the total cut flowers produced which is too much less. In Maharashtra, gladiolus is cultivated on large scale in Pune, Nashik, Kolhapur, Aurangabad and Nagpur districts. In Maharashtra, the total area under floriculture was 16000 ha during 2008-09 with a production of 89.4 t of loose flowers and 5728 million cut flowers (Anonymous, 2009). The latest technology of quality and flower production required to be adopted. The technology are selection of corms, treatments to corms, judicious use of fertilizers, disease and pest control and post harvest management, etc. However, the yield and quality production of flower is low which needs to be increased by adopting improved agro-techniques. Use of organic manures and inorganic fertilizer sources are essential to maintain the soil health and also to sustain productivity. An investigation was, therefore, conducted to find out the effect of organic and inorganic fertilizers on growth and flower quality of gladiolus cv. 'H.B. PITT'.

RESEARCH METHODS

The present investigation on effect of organic and inorganic fertilizers on growth and flower quality of gladiolus cv. H.B. PITT. was conducted at Department of Horticulture, Late Shri Vasantrao Naik Marathwada Agricultural University, Parbhani during *Kharif* season 2008-09. A field experiment was laid out in Randomized Block Design with three replications and ten treatments (Table 1). The soil of experimental plot was medium black with uniform texture and well drained. Soil samples of the experimental plot were analyzed to determine the physicochemical properties of experimental soil before planting. The treatment consisted were T_1 -100% RDF (control), T_2 -75% RDF + 25% FYM, T_3 -50% RDF + 50% FYM, T_4 - 25% RDF + 75% FYM, T_5- 75% RDF + 25% vermicompost, T_6-50% RDF + 50% vermicompost, T_7-25% RDF + 75% vermicompost, T_8 - 75% RDF + 25% biomeal , T_9-50% RDF +50% biomeal, T_{10}-25% RDF +75% biomeal. Organic manures *viz*., biomeal, vermicompost and FYM each were applied at 75, 50 and 25 per cent of recommended dose and light irrigation was given. The recommended dose of FYM, vermicompost and biomeal is 20 t ha^{-1}, 5 t ha^{-1} and 1t ha^{-1}, respectively. The recommended dose of N, P_2O_5 and K_2O *i.e.* 100:50:50 kg ha^{-1} was applied through urea, single super phosphate and muriate of potash, respectively. Half dose of N and full dose of P_2O_5 and K_2O was applied at the time of planting according to the treatment. Remaining half dose of N was applied about 30 days after planting. Height of the plant, number of leaves $plant^{-1}$ were recorded 90 days after planting. Fresh weight of the whole plant including leaves and corm was taken at final harvest of the spike. Dry weight of the plant was recorded in grams after complete drying of plant in oven. The length of spike was measured by meter scale from ground level to the tip of the spike at 50 per cent opening of florets of the observational plants. Girth of spike was measured with the help of vernier caliper at the base of spike at 50 per cent opening of florets and at 5 cm high from ground level. Length of rachis was measured from the first floret on the spike to the top of floret at 50 per cent flowering and average was worked out. The statistical analysis of data collected was done by following standard procedure described by Panse and Sukhatme (1967).

RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Growth parameters :

There was significant difference in respect of height of the plant, number of leaves, fresh weight and dry weight of plant as affected by different treatments (Table 1).

Height of the plant :

Data recorded at 90 days after planting indicate that maximum plant height (60.19 cm) was recorded in 50 % RDF + 50 % vermicompost followed by 50 % RDF + 50 % biomeal (58.80cm). Treatment 50 % RDF + 50 FYM (56.72 cm) was significantly at par with treatment 75 % RDF + 25 % vermicompost (56.20 cm), 75 % RDF + 25% Biomeal (55.72 cm),75 % RDF + 25 % FYM (55.35 cm), 100 % RDF *i.e.* control (54.78 cm) and 25 % RDF + 75 % vermicompst (53.21 cm). Minimum plant height (51.67 cm) was recorded in the treatment 25 % RDF + 75 % FYM. The increase in plant height due to vermicompost application might be due the fact that the vermicompost is a rich source of plant micronutrients (N, P, K), vital micronutrients (Fe, B, Zn and Me) and secondary elements. The vermicompost improves physicochemical properties, drainage, porosity and aeration of soil. Hence, the establishment of plants was good in plots supplied with vermicompost which resulted in increased height of the plant. The results are in agreement with Gharat (2004) in China aster. He reported that increase in growth parameters such as height of plant, spread of plant, number of leaves, number of branches, leaf area in China aster in the treatment of RDF + vermicompost. The results obtained are in confirmation with Gayatri *et al*. (2004) in Static, Swaminathan *et al*. (1999) and Kumar and Singh (2007) in Carnation, Bhavanisanker and Vanangamudi (2000) in Crossandra, Kathiresan (1999) in gladiolus, Patil *et al*. (2004) in jasmine.

Numbers of leaves :

At 90 days after planting, treatment 50 % RDF + 50 % vermicompost produced maximum number of leaves (16.93) followed by treatment 50 % RDF + 50 % Biomeal (16.19) which were at par with each other. Treatment 50 % RDF + 50 % vermicompost was also statistically at par with 50 % RDF + 50 % FYM (15.95), 75 % RDF + 25 % vermicompost (15.57) and 75 % RDF + 25 % biomeal (15.20). Minimum number of leaves

(13.17) were recorded in treatment 25 % RDF + 75 % FYM. The reason for increased number of leaves per plant could be attributed to the solubilization effect of plant nutrients by addition of vermicompost leading to increased uptake of N, P, K. Above findings are in close conformity with the findings of Sreenivas *et al*. (1998). They reported that in aster application of organic manure with N,P,K rate effectively increased leaf number compared to the treatment of organic alone in aster. The results are in confirmation with the findings of Mc Graw and Schenck (1980); Shah *et al.* (1984); Nandre *et al.* (2005) and Nethra *et al.* (1999) in China aster.

Fresh weight of plant :

It is evident from the data presented in Table 1 that maximum fresh weight of plant (274.94 g) was found in treatment 50 % RDF + 50 % vermicompost. Other treatments found next in order in this regard were 50 % RDF + 50 % FYM. (271.29 g) and 50 % RDF + 50 % biomeal (267.24 g). Lowest fresh weight (179.79 g) was found in treatment 25 % RDF + 75 % FYM. Due to the application of organic and inorganic fertilizers more shoot growth in terms of number of leaves was produced. As a result photosynthetic products and their translocation through pholem to root zone also increased which may have helped in production of maximum fresh weight of plant. The results are in confirmation with the findings of Gangadharan and Gopinath (2000) in gladiolus.

Dry weight of plant :

The data presented in Table 1 indicated that maximum dry weight of plant (53.23 g) was noticed in 50 % RDF + 50 % vermicompost which was singlificantly superior over 25 % RDF + 75 % FYM (31.15 g) and was followed by 50 % RDF + 50 % FYM (51.54 g). Treatment 50 % RDF + 50 % FYM (51.54 g) and 50 % RDF + 50 % biomeal (50.77 g) were superior over 25 % RDF + 75 % FYM (31.15 g) and were at par with each other. Lowest dry weight (31.15 g) was found in treatment 25 % RDF + 75 % FYM. Remaining treatments were found intermediate to dry weight production. Due to the application of organic and inorganic fertilizers more shoot growth in terms of number of leaves was produced. As a result photosynthetic products and their translocation through pholem to root zone also increased which may have helped in production of maximum dry weight of plant. The results are in agreement with Anupama and Adholeya (2000) in three seasonal ornamental plants *viz*., *Petunia hybrida, Callistephus chinesis* and *Impatiens balsmaia*. They reported that when these three seasonal oramental plants were inoculated with mixed indigenous AM culture when grown on marginal waste lands amended with organic matter, the three plant species showed the improvement in reproductive and vegetative (dry matter) growth of the plants. The results are in confirmation with the findings of Gangadharan and Gopinath (2000) in gladiolus.

Flower quality :

Length of spike :

Data from Table 1 clearly indicates that treatment 50 % RDF + 50 % vermicompost exhibited maximum length of spike (80.28 cm) followed by 50 % RDF + 50

Table 1: Effect of organic and inorganic fertilizers on growth and flower quality of gladiolus (*Gladiolus grandiflorus* L.) H.B. Pitt

Sr. No.	Treatments	Height of plant (cm)	Number of leaves (plant $^{-1}$)	Fresh weight of plant (g)	Dry weight of plant (g)	Length of spike (cm)	Length of rachis (cm)	Diameter of spike (cm)
		90 days after planting						
T_1	100% RDF (control	54.78	14.87	241.24	46.09	75.23	37.00	2.00
T_2	75% RDF + 25% FYM	55.35	15.01	244.20	46.39	75.53	38.43	2.06
T_3	50% RDF +50% FYM	56.72	15.95	271.29	51.54	77.36	41.04	2.30
T_4	25% RDF + 75% FYM	51.67	13.17	179.79	31.15	72.50	35.09	1.90
T_5	75% RDF + 25% vermicompost	56.20	15.57	255.15	48.45	77.35	39.66	2.18
T_6	50% RDF + 50% vermicompost	60.19	16.93	274.94	53.23	80.28	41.50	2.60
T_7	25% RDF +75% vermicompost	53.21	13.70	238.68	45.22	75.15	36.63	1.93
T_8	75% RDF + 25% biomeal	55.72	15.20	246.74	47.74	76.35	38.90	2.13
T_9	50% RDF + 50% biomeal	58.80	16.19	267.24	50.77	78.51	41.11	2.40
T_{10}	25% RDF + 75% biomeal	52.87	13.42	224.39	42.63	74.20	35.62	1.90
	S.E. $\pm$	1.18	0.61	5.34	0.72	0.08	0.06	0.07
	C.D. (P=0.05)	3.52	1.83	15.85	2.15	0.25	0.19	0.2

% biomeal (78.51 cm) and 50 % RDF + 50 % FYM (77.36 cm). Treatment 25 % RDF + 75 % FYM, 25 % FYM + 75 % biomeal, and 25 % RDF + 75 % vermicompost produced short length of spike as compared to control (100% RDF). Lowest spike length (72.50 cm) was produced by treatment 25 % RDF + 75 % FYM. Maximum vegetative growth of plant might have produced largest spike length. Treatment 50 % RDF + 50 % vermicompost produced plants of maximum height and number of leaves might have resulting in longest spike length.The results are in confirmation with the findings of Gangadharan and Gopinath (2000) and Vasanta kumari *et al*. (2013) in gladiolus.

Legnth of rachis :

Data from Table 1 clearly indicate that treatment 50 % RDF + 50 % vermicompost exhibited maximum length of rachis (41.50 cm) followed by treatments 50 % RDF + 50 % biomeal and 50 % RDF + 50 % FYM. Treatment 50 % RDF + 50 % vermicompost was found significantly superior over other treatments. Treatments 25 % RDF + 75 % vermicompost, 25 % RDF + 75 % biomeal and 25 % RDF + 75 % FYM produced short length of rachis as compared to control (100 % RDF). Lowest rachis length (35.09 cm) was produced by the tratment 25 % RDF + 75 % FYM. In the treatment 50 % RDF + 50 % vermicompost and 50 % RDF + 50 % biomeal, the plants observed with the highest rachis length. Maximum vegetative growth of plant might have produced largest rachis length. Treatment 50 % RDF + 50 % vermicompost produced plants of maximum height and number of leaves might have resulting in longest rachis length. Similar results were obsereved by Dange (2001) in chilli. He found that the length of chilli fruit and pedicel were maximum when plants supplied with 50 % organic manure and 50 % inorganic fertilizer than they both supplied alone. The results are in confirmation with the findings of Gangadharan and Gopinath (2000) and Vasanta kumari *et al*. (2013) in gladiolus.

Girth of spike :

It is evident from the data presented in Table 1 that treatment 50 % RDF + 50 % vermicompost which was found at par with 50 % RDF + 50 % biomeal. Treatments 100 % RDF, 25 % RDF + 75 % vermicompost, 25 % RDF + 75 % FYM and 25 % RDF + 75 % biomeal were at par with each other. Treatment 75 % RDF + 25 % vermicompost was found superior over treatment 75 % RDF + 25 % biomeal and 75 % RDF + 25 % FYM. Minimum girth of spike produced by treatments 25 % RDF + 75 % FYM (1.90 cm) and 25 % RDF + 75 % biomeal (1.90 cm). In general, growth of plant is reflected through the girth of spike which was caused due to continuous availability of nutrients. The increase in girth of spike may be due to more number of leaves which leads to increased photosynthetic rate. Similar results were abserved by Vasanta Kumari *et al*. (2013) in gladiolus. They observed that maximum spike girth (1.10 cm) was recorded in treatment 75 per cent RDF + vermicompost + VAM + *Azospirillum* + *Trichoderma* in gladiolus cv. AMERICAN BEAUTY. These findings are in confirmation with the results of Vasanthi (1994) in Jasmine, Chang (1989) in gerbera, Manthur (1988) in China aster and Kathiresan (1999) in gladiolus.

On the basis of present studies, it can be inferred that gladiolus crop should be provided, the nutrition in the form of 50 % RDF + 50 % vermicompost per hectare for obtaining better plant growth and flower quality of gladiolus.

REFERENCES

Anonymous (2009). Indian Horticulture database, N.H.B., Govt. of India.

Anupama, G. and Adholeya, A. (2000). Growth and flowering in *Petunia hybrida, Callistephus chinensis* and *Impatines balsamia* inoculated with mixed AM inocula or chemical fertilizers in a soil of low P fertility. *Sci. Hort.*, **84** (1-2) : 151-162.

Bhalla, Rajesh, Shiva kumar, M.H. and Jain, Ritu (2008). Effect of organic manures and biofertilizers on growth and flowering in standard carnation (*Dianthus caryophyllus* Linn.). *J. Orn. Hort.*, **10** (4):229-234.

Bhatia, Suman and Gupta, Y.C. (2007). Studies on use of biofertilizers in carnation (*Dianthus caryophyllus* L.) flower production. *J. Orn. Hort.*, **10** (2): 131-132.

Bhavanisankar, K. and Vanangamudi, K. (2000). *Integrated* nutrient management in crossandra (*Crossandra infundibuliformis* L.). *South Indian J. Hort.*, **47**(1-6):125-129.

Chang, S.F. (1989). Single spore culture of VAM fungi and their effect on three flower crops. M.Sc. Thesis, Dept. of Hort. *National Taiwan, Univ.*, pp.101.

Dange, R.G. (2001). Effect of organic and inorganic fertilizers on yield and quality of chilli (*Capsicum annum* L). M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, M.S. (INDIA).

Gangadharan, G.D. and Gopinath, G. (2000). Effect of organic

and inorganic fertilizers on growth, flowering and quality of gladiolus cv. WHITE PROSPERITY. *Karnataka J. Agric. Sci.*, **13** (2): 401-405.

Gayatri, H.N., Jayaprasad, K.V. and Narayanaswamy, P. (2004). Response of biofertilizers and their combined application with different levels of inorganic fertilizers in statice (*Lumonuan caspia*). *J. Orn. Hort.*, **7** (1):70-74.

Gharat, S.N. (2004). Effect of organic and inorganic fertilizers on growth, yield and vaselife of China aster [*Callistephus chinensis* (L.) Nees]. M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, M.S. (INDIA).

Kathiresan, C. (1999). Effect of Bio-fertilizers with different levels of nitrogen and phosphorus on growth, yield and quality of gladiolus (*Gladiolus grandiflorus* Ness). M.Sc. (Hort.) Thesis, University of Agricultural Sciences, Bangalore, KARNATAKA (INDIA).

Kumar,Vijay and Singh, Abnit (2007). Effect of vermicompost and VAM inoculation on vegetative growth and floral attributes in china aster. *J. Orn. Hort.*, **10**(3):190-192.

Manthur, S.M. (1988). Studies on nitrogen, growth regulators and soil salinity on flower and seed production in china aster (*Callistephus chinensis*) cv. OSTRICH PLUME MIXED. Ph.D. Thesis, University of Agricultural sciences, Dharwad, KARNATAKA (INDIA).

Mc Graw, A.C. and Schenck, N.C. (1980). Growth stimulation of citrus, ornamental and vegetable crops by selected mycorrhizal fungi. *Proc. Florida State Hort.Sci.*, **93** : 201-205.

Nandre, D.R., Jogdande, N.D., Dalal.,S.R., Bansode, A.B. and Bharati S. Chaudhale (2005). Effect of *Azatobacter* on growth and yield of china aster under nitrogen doses. *Crop. Res.*, **29**(2):272-274.

Nethra, N.N., Jayaprasad, K.V. and Kale, R.D. (1999). China aster [*Callistephus chinensis* (L.) Nees] cultivation using vermicompost as organic amendment. *Crop. Res.* Hisar,**17** (2): 209-215.

Panse, P.V. and Sukhatme V.G. (1967). *Statistical method of agricultural worker*. ICAR Publication, New Delhi (India).

Patil, S.R., Reddy, B.S. and Prasanth, J.M. (2004). Effect of organic, inorganic and in situ vermiculture on chlorophyll content and flower yield of *Jasminum sambac* Ait. *J. Orn. Hort.*, **7** (3-4):164-167.

Shah,A., Lal, S.D. and Seth, J.N. (1984) . Effect of different levels of nitrogen and phosphorus on growth, flowering and corm yield of gladiolus cv. 'VINKS GLORY'. *Prof. work.*, **16** (3-4):305-307.

Sreenivas, K.V., Narayanagowda, J.V. and Narayanswamy, P. (1998). Effect of different organic manures on growth and flower yield of china aster. *Karnataka J. Agri. Sci*., **11** (3) : 858-861.

Swaminathan,V., Ramaswamy, N. and Pillai, J.O.A.A. (1999). Effect of *Azospirillum*, phosphobacteria and inorganic nutrients on the growth and yield of tuberose. *South Indian J. Hort.*, **47** (1-6):331-334.

Vasantha Kumari, R., Kumar, D.P., Mahadevamma, M. and Arunkumar, B. (2013). Effect of integrated nutrient management on growth and floral parameters in gladiolus (*Gladiolus hybridus* L.) cv. AMERICAN BEAUTY. *Asian J. Hort.*, **8** (1) : 274-279.

Vasanthi, G. (1994). M.Sc. (Hort.) Thesis, Tamil Nadu Agricultural University , Coimbatore,T.N. (INDIA).