Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6013

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (6):** 996-999 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Organic Manures and Bio Fertilizers on Vegetative Growth in Tuberose (*Polyanthus tuberosa*) var. Shringar

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Received: 20.11.2017 | Revised: 18.12.2017 | Accepted: 22.12.2017

ABSTRACT

The present investigation was carried out at the Model Floriculture Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, District Udham Singh Nagar (Uttarakhand) during April, 2010 to March, 2012 to find out suitable organic manures and biofertilizers for vegetative growth of tuberose var. Shringar. Maximum plant height at 90 days (45.10 cm) was recorded in treatment vermicomposting (2 kg/ m^2) and the minimum plant height was obtained in treatment poultry manure (1 kg/ m^2) (37.39). The treatment vermicompost (2 kg/ m^2) recorded maximum number of leaves per plant (86.25). Minimum value was observed in treatment poultry manure (1 kg/ m^2) (78.02) during both the years.

Key words: *Vermicompost, Biofertilizers, Polyanthus Tuberosa, Organic Farming*

INTRODUCTION

Nowadays organic farming is being attempted in floriculture also, to improve quality and production of flower crops. Research is going on different commercially important flower crops. Among different flower crops, tuberose (*Polyanthus tuberosa*) is an important commercial flower crop in India, It belongs to family Amaryllidaceae. It is a bulbous perennial perpetuating itself through bulbs. The aerial portion consists of a rosette of leaves, which are narrow, linear and light green. Inflorescence is known as spike and bears the florets in pairs. It is extensively cultivated on a large scale in France, South Africa and USA. In India, it is under commercial cultivation in states of Karnataka, Maharashtra, Tamil Nadu and West Bengal. However, it is adapted to North Indian climatic conditions and grows well in parts of Uttar Pradesh, Uttarakhand, Haryana and Punjab[7]. The spikes are useful as cut flowers for vase decoration and bouquets, while individual flowers used for making veni, garland, button holes and essential oil extraction.

Nutrition management of tuberose is an important and integral component of organic farming to manage the environment. The importance of organic farming in commercial floriculture has been realized recently throughout the world.

Cite this article: Preetham, S.P., Srivastava, R. and Bintory, M.A., Effect of Organic Manures and Bio Fertilizers on Vegetative Growth in Tuberose (*Polyanthus tuberosa*) var. Shringar, *Int. J. Pure App. Biosci.* **5(6):** 996-999 (2017). doi: http://dx.doi.org/10.18782/2320-7051.6013

There is an increase in demand for homogenous organic substrates, which has led to intensive research for producing high quality products by using low cost substitute.

The quantum of inorganic fertilizers can be reduced by exploring the possibilities of using organic waste materials in production of this crop. After green revolution, the continuous use of fertilizers has led to an increase in crop production. This was achieved due to improved varieties and high dosage of fertilizers. But, continuous use of fertilizers has some drawbacks, as it adversely affects the environment, soil structure and fauna. Therefore, now there is awareness worldwide about alternative or natural or organic agriculture practices, in view of energy storage, food safety and environmental concerns arising out of conventional farming.

MATERIAL AND METHODS

The present investigation was conducted at Model Floriculture Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, during 2010 and 2011. Pantnagar is geographically situated in the *Tarai* region at the foot hills of Himalayas at 29° N latitude and 79.3° E longitude and at an altitude of 243.83 meters above the mean sea level. The climate of the region is broadly humid subtropical with cool winter and hot dry summer. During hot summer, maximum temperature exceeds 40^{0}C, while in winters, the minimum temperature occasionally touches 0^{0}C. Monsoon occurs from the third week of June to the middle of September. Frost is expected from late December to February. The mean relative humidity remains almost 80-90 per cent from mid June to end of February and then it steadily decreases to 50 per cent by the first week of May and remains so till mid-June. The treatments Control (40g N, 20g P, 20g K per m2) [T1], Poultry manure (0.5 kg/m2) [T2], Vermicompost (1 kg/m2) [T3], *Trichoderma harzianum*. (20 g/m2) [T4], *Pseudomonas fluoroscens*. (20 g/m2) [T5], Poultry manure (1 kg/m2) [T6], Vermicompost (2 kg/m2) [T7], *Trichoderma harzianum*. (40 g/m2) [T8], *Pseudomonas fluoroscens*. (40 g/m2) [T9] and common basal dose of FYM 2kg/m2/yr were used in this research. The Chemical fertilizers *viz.*, nitrogen in the form of urea, phosphorus in the form of single super phosphate and potassium in the form of murriate of potash and FYM were used. *Trichoderma harzianum*and *Pseudomonas fluoroscens* were obtained from Department of Plant Pathology; Poultry manure was obtained from Instructional Poultry farm, Nagla. One kg of FYM was enriched with *Trichoderma harzianum* and *Pseudomonas fluoroscens* separately and mixture was kept under shade for 20 days for growth and multiplication of the cultures. The FYM enriched with bioagents were applied in the field during planting and the basal of FYM was reduced by 1kg in each treatment accordingly. Observation on vegetative growth parameters were recorded from five randomly selected plants of each replications using standard procedure. Data were subjected to analysis of variance.

RESULTS AND DISCUSSION

It is evident from the data presented in Table 1 that the plant height at 60 days revealed that maximum height (37.67 cm) was recorded in T_2 [poultry manure (0.5 kg)]. The lowest (33.35 cm) was recorded in T_6 [poultry manure (1 kg)].However, at 90 days after vegetative bud emergence, the treatment T_7 [vermicompost (2 kg)]gave the maximum plant height in both the years, 2010 and 2011(43.00 cm and 47.20 cm, respectively) which was *at par* with T_1 [control] (40.75 cm and 43.37 cm) followed by T_2 [poultry manure (0.5 kg)](41.00 cm and 45.27 cm, respectively) in both the years. The pooled data for both the years revealed that maximum plant height was observed in treatment T_7 [vermicompost (2 kg)] (45.10 cm) whereas, minimum plant height was obtained in treatment T_6 [poultry manure (1 kg)] (37.39cm).

The vermicompost and poultry manure are rich source of nitrogen and release nutrients at a slow rate which help in the vegetative growth[5]. Hence at 60 and 90 days the plant height was found maximum in these treatments. The results were in accordance with the earlier findings. The positive effect of vermicompost on plant growth has been reported in china aster by Srinivas and Naryana Gowda they reported that application of vermicompost (5 tonnes/ha) and FYM (15 tonnes/ha) with recommended NPK increased the plant height, number of leaves number of branches and flower yield. Furthermore, enhanced plant height may also be attributed to the presence and synthesis of gibberellins in vermicompost. Gibberellins cause both cell elongation and division that stimulates elongation and resulted in increase in plant height. The above results are in conformity with the findings of Gayathri*et al.*[3] who reported increased plant height, number of leaves, highest number of branches and highest flower yield per plant of statice were obtained with the application of 75 per cent NP + 100 per cent K + Vermicompost +PSB. Hemavathy[4] stated that chrysanthemum plants inoculated with *Azotobacter* (50 g/m^2) produced better plant height and number of branches as compared to control.

The data presented in Table 1 envisage that among different organic manures and bio fertilizers treatments revealed that maximum number of leaves per plant at 90 days after vegetative bud emergence was observed in T_7 [vermicompost (2 kg)] (66.27) and it was minimum in T_6 [poultry manure (1 kg)] (59.95).

The maximum number of leaves per plant at 120 days after vegetative bud emergence was observed in T_7 [vermicompost (2 kg)] (86.25) and the minimum was attained in T_6 [poultry manure (1 kg)] (78.02).

Leaves are the photosynthetic part of plant, the yield of crop is directly correlated with number of leaves. This might be due to the increased availability of nitrogen, which is an important constituent of chlorophyll and protein thus causing more growth[1]. These finding were in conformity with Vijay Kumar and Singh[9] who studied the effect of vermicompost and VAM inoculation on vegetative growth in China aster (*Callistephus chinensis* L. Nees) and found that application of vermicompost @ 10 t/ha resulted in significantly taller plants, highest number of leaves and branches per plant with maximum plant spread as compared to their respective controls. They also reported that application of vermicompost @ 10 t/ha in combination with VAM @ 5 g per plant produced maximum plant height, number of leaves per plant, plant spread, number of branches per plant and stem diameter. The photosynthetic system is activated for enhanced biological efficiency, enabling synthesis of maximum metabolites and photosynthates, thus encouraging quick growth[6]. The results were in line as obtained by Singh *et al*[8] who found that the treatment (300 kg vermicompost +1.0 kg urea +1.8 kg SSP + 0.5 kg MOP/100 m^2**)** produced better length of spike in gladiolus cv. American Beauty. Castro *et al.*[2] evaluated the effect of different organic fertilizers on the yield of gladiolus cv. Red Beauty and reported that the poultry manure significantly enhanced the biomass. These results suggest that the nutrients provided by vermicompost and poultry manure were useful in increasing the chlorophyll content and the number of leaves. Thereby helpful in enhancing the biomass.

Table 1: Plant height at different growth stages as influenced by organic culture and biofertilizers in tuberose var. Shringar

Sl. No.	Treatments		Plant height (cm)					
			60 days			90 days		
			2010	2011	Pooled	2010	2011	Pooled
1.	T_1	Control	34.45	37.85	36.15	40.75	43.37	42.06
2.	T_2	Poultry manure (0.5 kg/ m^2)	36.00	39.34	37.67	41.00	45.27	43.13
3.	T_3	Vermicompost (1 kg/ m^2)	33.65	36.35	35.00	39.10	43.00	41.05
4.	T_4	*Trichoderma* sp. (20 g/ m^2)	32.35	35.91	34.13	37.35	41.72	39.53
5.	T_5	*Pseudomonas sp.* (20 g/ m^2)	32.35	34.70	33.52	36.32	40.55	38.43
6.	T_6	Poultry manure (1 kg/ m^2)	31.15	35.56	33.35	37.50	37.29	37.39
7.	T_7	Vermicompost (2 kg/ m^2)	35.10	37.66	36.38	43.00	47.20	45.10
8.	T_8	*Trichoderma sp.* (40 g/ m^2)	32.75	35.95	34.35	38.65	42.00	40.32
9.	T_9	*Pseudomonas sp.* (40 g/ m^2)	34.40	38.26	36.33	39.15	42.35	40.75
SEm±			0.58	0.34	0.34	0.75	0.74	0.60
CD at (5%)			1.71	1.00	1.01	2.19	2.17	1.75

Table 2: Leaf count per plant at different growth stages as influenced by organic culture and bio fertilizers in tuberose var. Shringar

Sl. No.	Treatments		No. of leaves					
			90 days			120 days		
			2010	2011	Pooled	2010	2011	Pooled
1.	T_1	Control	62.65	65.64	64.15	82.15	84.62	83.38
2.	T_2	Poultry manure (0.5 kg/ m^2)	64.55	66.03	65.29	82.55	86.00	84.27
3.	T_3	Vermicompost (1 kg/ m^2)	62.25	64.72	63.48	83.75	86.51	85.13
4.	T_4	*Trichoderma sp.* (20 g/ m^2)	60.45	63.03	61.74	78.75	79.29	82.43
5.	T_5	*Pseudomonas sp.* (20 g/ m^2)	59.50	61.45	60.47	78.85	80.50	79.67
6.	T_6	Poultry manure (1 kg/ m^2)	58.70	61.20	59.95	77.80	78.24	78.02
7.	T_7	Vermicompost (2 kg/ m^2)	64.90	67.65	66.27	84.50	88.00	86.25
8.	T_8	*Trichoderma sp.* (40 g/ m^2)	61.55	63.50	62.52	80.10	81.22	80.66
9.	T_9	*Pseudomonas sp.* (40 g/ m^2)	60.50	62.97	61.73	80.70	84.16	79.02
SEm±			0.85	0.85	0.62	0.69	0.60	0.52
CD at (5%)			2.49	2.49	1.83	2.04	1.75	1.54

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