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Integrated Nutrient Management: An Emerging Technology for Sustainable Production of Tuberose.

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Abstract
The investigation entitled "Effect of integrated nutrient management in tuberose (Polianthes tuberosa L.) " was carried out in the Department of Horticulture, CCR(PG) CLG, Muzaffarnagar. The experiment was laid out in randomized block design comprising of eleven treatment combinations of different nutrients with three replications. Results show that the minimum days taken to sprouting was 12.99 by the 50 % RDF + 50 % Vermicompost + Azospirllum + PSB, and plant height was maximum after 90 days when 29.2 cm with the 75 % RDF + 25 % Vermicompost + Azospirllum + PSB, while the length of rachis and number of florets per spike was 99.14 cm and 33.99, respectively by same treatment (75 % RDF + 25 % Vermicompost + Azospirllum + PSB). In the case of a number of florets per spike, the diameter of the florets and flower duration (days) were 52.0, 5.0, and 19.66, respectively was also observed by applying the 75 % RDF + 25 % Vermicompost + Azospirllum + PSB. Our finding suggested that 75 % RDF + 25 % Vermicompost + Azospirllum + PSB is superior for the overall growth of tuberose

Key words: *Tuberose, Farm yard manure, Vermicompost, PSB, Azosporilium*

I. Introduction

Tuberose *(Polianthes tuberosa L.)*is one of the most important tropical ornamental bulbous flowering plants cultivated for production of long-lasting flower spikes. It is popularly known as Rajanigandha or Nishigandha. It belongs to the family *Amaryllidaceae* and is native of Mexico. **(Marjan *et. al.*, 2013).**Tuberose is an important commercial cut as well as loose flower crop due to pleasant fragrance, longer vase-life of spikes, higher returns and wide adaptability to varied climate and soil. They are valued much by the aesthetic world for their beauty and fragrance. The flowers are attractive and elegant in appearance with sweet fragrance. It has long been cherished for the aromatic oils extracted from its fragrant white flowers (**Preetham2017).** Tuberose blooms throughout the year and its clustered spikes are rich in fragrance; florets are star shaped, waxy and loosely arranged on spike that can reach up to 30 to 45 cm in length. The flower is very popular for its strong fragrance and its essential oil is important component of high- grade perfumes. 'Single' varieties are more fragrant than 'Double' type and contain 0.08 to 0.14 percent concrete which is used in high grade perfumes**(AfrozNazninet.al.,2015).**

The growing period of tuberose in normally one year or more. Therefore, a high amount of organic and inorganic fertilizers is needed to maintain sustainable growth and flowering over a long period. There are many factors which affect plant growth and economic cultivation of tuberose. Tuberose is a gross feeder and requires a large quantity of NPK, both in the form of organic and inorganic fertilizers **(Amarjeet and Godara, 1998).** Fertilizers have great influence on growth, building and flower production in tuberose **(*Polara* et al., 2004).**

Nitrogen, phosphorus and potassium have a significant effect on spike production and floret quality. Duration of flower in the field was improved through using organic fertilizer (Islam, 2011).The utilization of vermicompost in enhancing crop production by amending soil physical, chemical and biological properties has been recognized since so long. Vermicompost is an effective alternative for synthetic fertilizers as they have no harmful residual effects. It contains 1.9% of nitrogen, 2% of phosphorus, 0.8% of potassium, 500mg/kg of Mn and 100mg/kg of Cu **(Mukesh Kumar and Veena Chuadhay, 2018).**

Farmyard manure refers to the decomposed mixture of dung and urine of farm animals along with litter and left-over material from roughages or fodder fed to the cattle. On an average well decomposed farmyard manure contains 0.5 per cent N, 0.2 per cent P_2O_5 and 0.5 percent K_2O.**(Amarjeet and Godara, 1998).**In recent years, there have been serious concern about long-term adverse effect of continuous and indiscriminate use of inorganic fertilizers on deterioration of soil structure, soil health and environmental pollution **(Singh, 2000).** In contrast, to inorganic fertilizer the use of green manures and other organic matter can improve soil structure, improve nutrient exchange and maintain soil health and that is why interests have been raising in organic **(Marjan *et. al.*, 2013).**

II. Material and Method

The study was taken up in a randomized block design with eleven treatments and three replications in the Department of Horticulture, CCRD Clg, Muzaffarnagar. The treatments consisted of T1- Control, T2- RDF (240:160:100 kg NPK ha), T3- 50% RDF + 50% FYM, T4 – 50% RDF + 50% Vermicompost, T5- 75 % RDF + 25 % FYM, T6- 75 % RDF + 25 % Vermicompost, T7- 75 % RDF + 25 % FYM + Azospirllum, T8- 75 % RDF + 25 % Vermicompost + Azospirllum, T9- 75 % RDF + 25 % FYM + Azospirllum + PSB, T10- 75 % RDF + 25 % Vermicompost + Azospirllum + PSB, T11- 50 % RDF + 50 % FYM + Azospirllum + PSB and T12- 50 % RDF + 50 % Vermicompost + Azospirllum + PSB.

The experimental area was ploughed thoroughly with tractor drawn disc plough and cultivator to bring it to a fine tilth. Basal dose of fertilizers and organic manures were incorporated during land preparation. The recommended dose of fertilizers was applied to selective plots according to the treatments. Two third of nitrogen along with full doses of P and K were applied as basal at the time of planting. One thirds of nitrogen was top dressed at one month after planting. Urea, super phosphate and muriate of potash were used to supply N, P and K respectively. The organic inputs such as the Farmyard manure, vermicompost, and effective microorganisms were applied according to the treatments. Farmyard manure and vermicompost was obtained from the Department of Horticulture, CCRD Clg Muzaffarnagar.

III. Result and Discussion

Growth is one of the essential parameters for the attribution of yield. The biometric components like plant height, number of leaves and dry matter production have direct relationship with yield in tuberose **(Keisam et al., 2014).** Results shows that minimum days taken to sprouting was 12.99 by the T12 and plant height was maximum after 90 days when 29.2 cm with the T10 while length of rachis and number of florets per spike was 99.14 cm and 33.99, respectively by same treatment. In case of number of florets per spike, diameter of the florets and flower duration (days) was 52.0, 5.0 and 19.66, respectively was also observed by applying same treatment (T10) **(See Table).**

Treatments	Symbol	Days taken to Sprouting	Plantheight (cm) (90days)	Number of leaves per plant (90days)	Leaf area per plant(cm^2)	Days taken to first spike emergence.	No. of spikes per plant	Length of spikes	Length of rachis	No. of florets per spike	Diameter of the florets	Flower duration (days)
Control	T1	14.300	57.663	24.120	921.117	82.060	1.283	86.130	28.337	41.013	3.357	14.350
RDF (240:160:100 kg NPK ha)	T2	13.813	61.127	25.607	1,042.097	81.253	1.377	88.290	29.293	43.810	3.973	15.090
50% RDF + 50% FYM	T3	13.923	61.410	25.633	1,223.683	80.070	1.650	90.457	29.733	45.820	4.367	15.483
50% RDF + 50% Vermicompost	T4	13.823	61.550	25.703	1,230.477	80.090	1.670	90.790	29.847	45.893	4.383	15.613
75 % RDF + 25 % FYM	T5	13.680	61.650	26.393	1,164.863	78.180	1.950	93.177	30.557	47.627	4.513	16.250
75 % RDF + 25 % Vermicompost	T6	13.503	61.723	26.413	1,169.807	78.027	1.980	93.393	30.597	47.710	4.537	16.390
75 % RDF + 25 % FYM + Azospirllum	T7	13.610	63.057	27.647	1,362.340	76.980	2.100	94.857	31.807	48.027	4.567	17.077
75 % RDF + 25 % Vermicompost + Azospirllum	T8	13.620	63.120	27.710	1,370.497	76.867	2.123	95.040	31.877	48.153	4.567	17.280
75 % RDF + 25 % FYM + Azospirllum + PSB	T9	12.910	65.933	29.127	1,513.913	74.137	3.420	98.930	33.910	51.927	4.980	19.783
75 % RDF + 25 % Vermicompost + Azospirllum + PSB	T10	12.900	65.970	29.257	1,527.047	74.063	3.523	99.147	33.990	52.087	5.007	19.963
50 % RDF + 50 % FYM + Azospirllum + PSB	T11	13.030	62.027	28.157	1,426.980	74.980	3.120	98.293	32.910	50.877	4.587	18.547
50 % RDF + 50 % Vermicompost + Azospirllum + PSB	T12	12.997	64.780	28.503	1,433.947	74.873	3.140	98.363	32.933	50.970	4.607	18.620
C.D.		0.137	2.270	0.142	36.331	0.070	0.054	0.602	0.118	1.569	0.179	0.222
S.Em±		0.046	0.769	0.048	12.308	0.024	0.018	0.204	0.040	0.531	0.061	0.075
SE(d)		0.066	1.088	0.068	17.406	0.033	0.026	0.288	0.057	0.751	0.086	0.106
C.V.		0.595	2.131	0.308	1.663	0.053	1.397	0.376	0.222	1.924	2.357	0.765

Similar findings were reported earlier by **Gyatri and Aanad Kumar (2018)** by using vermicompost in chrysanthemum. The increase in the vegetative growth may due to better flow of various macro and micro nutrients along with plant growth substances into the plant system in the plots applied with vermicompost in Jasmine (**V. G. et al., 2005).** The number of side shoots plant-1 was influenced greatly by using vermicompost and humic acid along with 75 % RDF. The present results are in concordance with findings by **wangs et al. (1994)** in chrysanthemum, where vermicompost application has increased the number of side shoots. Similar results have been reported **by Nagalakshmi et al. (2010) in Anthurium**. The same treatment i.e. 75 % RDF, vermicompost + azosporilium +PSB also increased the number of leaves plant-1. Similar results was reported by Behnam Khodakhah et al. (2014) and Verlinden et al. (2010) by using humic acid in tuberose and by Mamta Bohra and Ajit Kumar (2014) by using vermicompost in chrysanthemum.

The treatment with vermicompost + azosporilium +PSB has also significantly influenced the leaf area when compared to control. However, the maximum leaf area was observed in the treatment with 75 % RDF, vermicompost + azosporilium +PSB. The results have been earlier found out by **Pandet et al. (1989)** in Anthurium and **Ahmad et al. (2013**) in Gladiolus. **Patil et al. (2004**) confirmed that using organic, inorganic and in situ vermiculture in Jasminiumsambac increased the number of flowers plant-1 by increasing the leaf area and chlorophyll content.

The results from correlation analysis indicated that the responses of the foliar PSB fertilizer on growth and development of chrysanthemum could be related with a constitutive increased net photosynthetic rate due to the high content of chlorophyll and the improved chloroplast ultra-structure **(Hong-mei Fan et al., 2014).**

Among the treatments, the treatment including vermicompost + azosporilium +PSB along with 75 % RDF had significantly influenced the dry matter production. In chrysanthemum, similar findings were reported by **kabir et al. (2001)** that the dry matter production was influenced by the effect of vermicompost on the dry matter production was reported by Hong-mei Fan et al. (2014).

Vermicompost is rich sources of micro and macro nutrients, Fe and Zn might have enhanced the microflora and enzymatic activity which might have augumented the plant growth. The positive effect of vermicompost of plant growth has been reported in china aster **(Nethra et al., 1999) and in golden rod (Keisam, 2014).**

IV. Conclusion

On the basis of the above results, it can be concluded that the application of 75% RDF + vermicompost + azosporilium +PSB was found to have beneficial effect on the growth of tuberose

References

[1]. **Marjan Shishehbor, Hamid Madani, Mohammad Reza Ardakani(2013).** Effect of vermicompost and biofertilizers on yield and yield components of common millet (Panicum miliaceum). Ann Biol Res. 4(2);174-180.

[2]. **Preetham S. P, Ranjan Srivastava and Mohammed Azhar Bintory(2017).** Effect of Organic Manures and Bio Fertilizers on Vegetative Growth in Tuberose (Polyanthus tuberosa) var. Shringar. International Journal of pure and applied bioscience. ISSN: 2320 – 7051 Int. J. Pure App. Biosci. 5 **(6)**: 996- 999 (2017).

[3]. **Afroz N, Mofazzal Hossain M, Kabita Anju-Man Ara, Azizul Hoque, Mazadul Islam and Tuhina hasan(2015).** Influence of Organic Amendments and Bio-Control Agent on Yield and Quality of Tuberose. Journal of Horticulture. 4**(6)**.

[4]. **Godara A.S. and N. R. Gupta, A.K. (2000).** Effect of nitrogen phosphorus and potash application on N.P.K. content in leaves of tuberose (Polianthes tuberose L.) Haryana journal of horticulture sciences. 29:, 27-29.

[5]. **Pansuriya PB and Chauhan RV (2015).** Effect of Integrated Nutrient Management on Growth, Yield and Quality of Gladiolus (Gladiolus grandifloru L.) Cv. Psittacinus Hybrid. Journal of Horticulture. DOI: 10.4172/2376- 0354.1000129

[6]. **Kumar. M. and Chaudhary. V.(2018)**. Effect of Integrated Sources of Nutrients on Growth, Flowering, Yield and Soil Quality of Floricultural Crops: A Review. International Journal of Current Microbiology and Applied Sciences.7**(3).**

[7]. **Godara. A. S., N. R. Gupta, A.K. (2000).** Effect of nitrogen phosphorus and potash application on N.P.K. content in leaves of tuberose (Polianthes tuberose L.) Haryana journal of horticulture sciences. 29: 1/2, 27-29.

[8]. **Pradeep. K., and S. Ramesh Kumar. (2014).** Effect of organic nutrients on growth, flowering and yield of Gladiolus grandiflorus. The Asian journal of horticulture. 9**(2)**, 416-420.

[9]. **Kumar. A. andGupta. R.K.(2018).** The effects of vermicompost on growth and yield parameters of vegetable crop radish (Raphanus sativus). Journal of Pharmacognosy and Phytochemistry; 7**(2)**: 589-592.

[10]. **Gayathri. H. N. and Narayanaswamy, P (2004).** Response of biofertilizers and their combined application with different levels of inorganic fertilizers in statice. Journal of Ornamental Horticulture. 7(1): 70- 74.

[11]. **V.G. PADAGANUR, A.N. MOKASHI AND V.S. PATI (2005).** Flowering, Flower Quality and Yield of Tuberose (Polianthes tuberosa Linn.) as Influenced by Vermicompost, Farmyard Manure and Fertilizers. Karnataka J.Agric.Sci.18**(3)**:729-734,

[12]. **Wange, S.S and Patil, P.L. (1994).** Response of tuberose to bio-fertilizers and nitrozen. Journal of Maha. Agric. Uni. 19 **(3):** 484-485.

[13]. **Panday, A. and Kumar, S. (1989).** Potential of Azotobacters and Azospirillum as biofertilizers for upload agriculture. A review journal ofscience indust.Res. 48**(3)**, 134-144.

[14]. **Patil. P. R. and Reddy. B. S. (2002).** Flowering and flower quality in tuberose as influenced by community planting fertilizer levels. Journal of Maharashtra Agricultural Universities 27**(1)**, 31-34

[15]. **Khairul MazedH. E. M. (2016).** Growth and Yield of Tuberose (Polianthes tuberosa Linn.) as Influenced by Nutrient Management. European academic research.ISSN 2286-4822

[16]. **Kabir. A., Iman MH., Mondal M.M.A. Chowdhury S. (2011).** Response of tuberose to integrated nutrient management. J of Environ. Sci. and Natural Resources 4**(2)**:55- 59.

[17]. **Nahas, E. (1996).** Factors determining rock phosphate solubilization by microorganism isolated from soil. World J. Microb. Biotechnol., **12**:18-23

[18]. **Keisam. P., K. and Kumar S.R. (2014).** Effect of organic nutrients on growth, flowering and yield of Gladiolus grandiflorus l. The Asian journal of horticulture: 9**(2)**, 416-420.

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