International Journal of Farm Sciences **4(1)** :55-59, 2014

Integrated nutrient management in tuberose, *Polianthes tuberosa* L

REENA KASHYAP, SVS CHAUDHARY, BS DILTA, BP SHARMA and YC GUPTA

Department of Floriculture and Landscaping
Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan 173230 HP
Email for correspondence: reenakshp375@gmail.com

ABSTRACT

A Field investigation was carried out to evaluate the effect of boifertilizers (*Azotobacter*, PSB) along with the chemical fertilizers (N, P and K) on the growth and flowering of the tuberose. The Experiment was laid out in randomized block design with the basal dose of FYM @ 5 kg/m^2 and 16 treatment combinations replicated thrice. The growth parameters (plant height, number of leaves per plant, days taken for emergence of bulbs) increased significantly with the increasing levels of chemical fertilizers along with the boifertilizers applications. Chemical fertilizers N, P and K application @ 15, 11.2 and 9.3 g/m^2 respectively along with the boifertilizers was optimum for the growth parameters.

Keywords: Tuberose; *Azotobacter;* PSB (Phosphorus Solubilising Bacteria); growth parameters

INTRODUCTION

Tuberose botanically known as *Polianthes tuberosa* belongs to family Amaryllidaceae. It is one of the most important bulbous ornamental plants grown for longer spike as excellent cut flowers and perfumery raw material for essential oil industry. To obtain higher cut spikes production progressive farmers are continuously using higher quantity of chemical fertilizers which results in reduced level of soil fertility. Therefore organic farming is one of the possible solutions to this problem.

In recent days boifertilizers have emerged as a supplement to mineral fertilizers and hold a promise to improve the yield as well as quantity of crop. Therefore keeping in view the need and importance of boifertilizers the present investigation was conducted with the objective of studying the effect of boifertilizers along with the chemical fertilizers on the growth parameters of the tuberose.

MATERIAL AND METHODS

The present investigation was

carried out at the experimental farm of the Department of Floriculture and Landscaping, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP during 2009-10. The experiment was laid out in a randomized block design with 16 treatment combinations replicated thrice with 25 plants per replication. The bulbs were planted on 16 June 2009 at a spacing of 25 cm x 25 cm. The size of bulbs was more than 1.5 cm and were planted at a depth of twice the diameter of the bulbs. The common basal dose was applied before planting ie FYM @ 5 kg/m^2 and application of boifertilizers @ 5g/plant at the time of planting. The boifertilizers were applied through slurry method at the time of planting. Slurry was prepared by mixing 200 g packet of boifertilizers in sufficient water and small quantity of gur was added to it so that the inoculants could stick to bulbs properly. The bulbs of tuberose were immersed in the suspension for 20 minutes and dried in shade before planting. Chemical fertilizers N, P and K were applied @ 200, 150 and 125 kg/ha respectively. Half dose of nitrogen and full doses of phosphorus and potassium were applied at the time of planting whereas remaining half dose of nitrogen was applied one month after the first application. The observations were recorded on various growth parameters viz days taken for emergence of bulbs, per cent sprouting of bulbs, plant height and number of leaves per plant.

RESULTS AND DISCUSSION

On the basis of pooled data analysis out of the 16 treatments evaluated for their response to tuberose the minimum days (8.16 days) were taken for sprouting of bulbs in treatment T_{12} (*Azotobacter* + PSB + N, P and K @ 15, 11.2, 9.3 g/m^2 respectively) which was found to be statistically at par with treatments T_{15} (8.20 days), T_{13} (8.30), T_{16} (8.36 days), T_{14} (8.36 days), T_{11} (8.56 days), T_{10} (8.73 days) and T (9.63 days). However minimum time taken for emergence of bulbs (12.36 days) was observed in T_1 ie control. The earliest emergence of bulbs in T_{12} might be due to the early absorption of N, P and K through the surface of bulbs or primary root which might have stimulated early emergence when treated directly with *Azotobacter* and PSB as they help in supplying nitrogen and phosphorus. Hence application of boifertilizers including N, P and K increased the availability of micro-nutrients as well as plant hormones due to which the time taken for emergence of bulbs was reduced significantly. Mukhopadhayay and Banker (1986) and Amarjeet Singh et al (1996) also reported similar results when they applied nitrogen and phosphorus alone and in combination. Similar findings have also been reported by Chaudhary (2009) with the application of N, P and boifertilizers alone or in combination in tuberose cv Double.

The effect of N, P and K alone and in combination with boifertilizers on per cent sprouting of bulbs was found to be non-significant. However response varied with the different treatments. The increasing levels of N, P and K alone and in combination with boifertilizers increased the per cent sprouting of bulbs to 100 per cent in comparison to the control. This is because tuberose is a hardy crop and can be grown successfully on a wide range of soil and climatic conditions as well as higher levels of N, P and K through chemical fertilizers alone or in combination with PSB and *Azotobacter* that contributed much for the improvement in per cent sprouting of bulbs. These results are in conformity with the findings of Chaudhary (2009) in tuberose cv Double.

The maximum number of leaves (72.56) was observed in T_{12} (*Azotobacter* + PSB + N, P and K @ 15, 11.2, 9.3 g/m^2 respectively) followed by T_{16} (71.76), T_{14} (71.60) and T_{10} (70.43). Whereas minimum leaves per plant (56.53) were observed in T_1 (control). The increase in number of leaves in T_{12} may be due to increased nitrogen availability as it is a constituent of protein, component of protoplast and increases the chlorophyll content in leaves. All these factors contribute to cell multiplication, cell enlargement and differentiation which could have resulted in better photosynthesis and ultimately exhibited better vegetative growth. Thus the number of leaves in the treatment increased significantly in comparison to control. Yadav et al (1985) and Banker and Mukhopadhayay (1990) reported increased number of leaves in case of inorganic fertilizers (N, P and K) application in tuberose. Srivastava and Govil (2007) reported increased number of leaves in gladiolus cv American Beauty with the application of boifertilizers viz *Azotobacter*, PSB and VAM.

The maximum plant height (106.70 cm) was recorded in treatment T_{12} (*Azotobacter* + PSB + N, P and K @ 15, 11.2, 9.3 g/ m^2 respectively) and was found to be statistically at par with treatments T_{16} (106.50 cm), T_{14} (106.33), T_{13} (106.06 cm), T_{15} (105.90 cm) and T_{11} (105.73 cm). However minimum plant height (84.26 cm) was observed in T_1 (control). The increase in plant height might be due to the increased availability of nitrogen and phosphorus by using boifertilizers as nitrogen is a constituent protein which is essential for the formation of protoplasm thus improving the cell division, cell enlargement and ultimately increase the plant height. Amarjeet Singh (1992) has reported a significant effect of nitrogen and phosphorus on plant height of tuberose. The study of Yadav et al (2005) and Chaudhary (2007) also confirms these results. They also reported that the use of boifertilizers along with increased levels of inorganic fertilizers (N, P and K) increases the plant height in tuberose.

Table 1. Effect of different integrated nutrient management treatments on days taken for emergence of bulbs and per cent sprouting of bulbs, number of leaves per plant and plant height in tuberose, *Polianthes tuberosa* L

Treatment	Days taken for emergence of bulbs	Per cent sprouting of bulbs	Number of leaves per plant	Plant height (cm)
T_1 = Control	12.56	91.91(9.58)*	56.53	84.26
T_2 = Azotobacter	11.43	97.92(9.89)	59.43	85.60
T_3 = PSB	11.45	97.92(9.89)	58.66	86.20
T_4 = Azotobacter + PSB	10.90	100.00(10.0)	59.33	87.76
T_5 = N, P and K @ 10, 7.5, 6.25 g/m^2)	10.53	95.83(9.78)	64.50	89.23
T_6 = Azotobacter + N, P and K @ 10, 7.5, 6.25 g/m^2	10.70	97.92(9.89)	64.13	90.00
T_7 = PSB + N, P and K @ 10, 7.5, 6.25 g/m^2	10.26	97.92(9.89)	64.13	91.13
T_8 = Azotobacter + PSB + N, P and K @ 10, 7.5, 6.25g/m^2	11.50	100.00(10.0)	65.03	92.70
T_9 = N, P and K @ 15, 11.2, 9.3 g/m^2	9.63	93.75(9.67)	67.96	100.50
T_{10} = Azotobacter + N, P and K @ (15, 11.2, 9.3 g/m^2	8.73	98.83(9.93)	70.43	104.40
T_{11} = PSB + N, P and K @ 15, 11.2, 9.3 g/m^2	8.56	97.92(9.89)	68.96	105.73
T_{12} = Azotobacter + PSB + N, P and K @ 15, 11.2, 9.3 g/m^2	8.16	100.00(9.99)	72.56	106.70
T_{13} = N, P and K @ 20, 15, 12.5 g/m^2	8.30	99.88(10.0)	69.76	106.06
T_{14} = Azotobacter + N, P and K @ 20, 15, 12.5 g/m^2	8.36	100.00(10.0)	71.60	106.33
T_{15} = PSB + N, P and K @ 20, 15, 12.5 g/m^2	8.20	95.83(9.78)	69.73	105.90
T_{16} = Azotobacter + PSB + N, P and K @ 20, 15, 12.5 g/m^2	8.36	99.83(9.98)	71.76	106.50
$CD_{0.05}$	2.18	NS	2.56	0.89

It may be concluded that before planting application of basal dose of FYM @ 5 kg/ m^2 and boifertilizers application along with the chemical fertilizers ie the treatment T_{12} (*Azotobacter* + PSB + N, P and K @ 15, 11.2, 9.3 g/m^2 respectively) significantly improved the various growth parameter like days taken for emergence of bulbs, per cent sprouting of bulbs, plant height and number of leaves per plant in tuberose which was found to be statistically at par with T_{16} (*Azotobacter* + PSB + N, P and K @ 20, 15, 12.5g/ m^2 respectively). This shows that the higher dose of N, P and K can be reduced with the application of boifertilizers in combination with the chemical fertilizers (N, P and K) at low doses which ultimately can reduce approximately 25 per cent of the chemical fertilizers.

REFERENCES

Amarjeet Singh 1992. Studies on the nutritional requirement and vase life of tuberose (*Polianthes tuberosa* L) cv Single. PhD thesis, CCS Haryana Agricultural University, Hisar, Haryana, India.

Amarjeet Singh, Godara NR and Ashok Kumar 1996. Effect of NPK on flowering and flower quality of tuberose (*Polianthes tuberosa* L) cv Single. Haryana Agricultural University Journal of Research **26(1)**: 43-49.

Banker GJ and Mukhopadhayay A 1990. Effect of NPK on growth and flowering in tuberose cv Double. Indian Journal of Horticulture **47(1)**: 120-126.

Chaudhary Satyavir Singh. 2007. Effect of nitrogen, phosphorus and biofertilizers application on plant growth and bulb production in tuberose. Haryana Journal of Horticultural Sciences **36(1&2)**: 82-85.

Chaudhary SVS 2009. Influence of various biofertilizers on growth, flowering and bulb production in tuberose (*Polianthes tuberosa* L) cv Double. *Annals of Horticulture* **2(1)**: 92-94.

Mukhopadhyay A and Banker GJ 1986. Studies on nutritional requirement of tuberose. South Indian Horticulture **34(3)**: 167-172.

Srivastava Ranjan and Govil Mansee 2007. Influence of biofertilizers on growth and flowering in gladiolus cv American Beauty. Acta Horticulturae **742**: 183-188.

Yadav BS, Gupta AK and Sukhbir Singh 2005. Studies on the effect of nitrogen, plant spacing and biofertilizers on growth parameters in tuberose cv Double. Haryana Journal of Horticultural Sciences **34(1-2)**: 78-80.

Yadav LP, Bose TK and Maiti RG 1985. Response of tuberose (*Polianthes tuberosa* L) to nitrogen and phosphorus fertilization. Progressive Horticulture **17(2)**: 83-86.

Received: 28.11.2013 ***Accepted: 26.12.2013***