



Growth, flowering and bulb yield of Tuberose (*Polianthes tuberosa* L.) cv. Mexican Single as affected by nitrogen and phosphorus under varying spacing

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Abstract

An field experiment on tuberose cultivar Mexican Single was conducted at Research Farm, Crop Cafeteria Unit (CCU) of Krishi Vigyan Kendra, Hastinapur, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (UP) India during the year 2014- 15 and 2015-16. The treatments compared three levels of N (100, 150 and 200 kg N/ha), three levels of P₂O₅ (100, 150 and 200 kg P₂O₅/ha) and with two spacing *i.e.*, 10 x 20 and 20 x 20 cm in a Randomized Complete Block Design (RCBD) with the three replications. To the results obtained that for the maximum yield of spikes flowers and bulbs production of tuberose to be planted at a closer spacing of 10 x 20 cm and with a fertilized 200 kg of N and 150 kg P₂O₅ per hectare. The effect of spacing on vegetative growth and floral characters was observed to be non- significant. The spikes per plant were found to be maximum under wider spacing (20 x 20 cm). To the application of nitrogen at 200 kg/ ha recorded significantly the highest value of vegetative and floral parameters. The number of days to first flowering was earlier at higher level of nitrogen. The response of phosphorus was non- significant on vegetative characters while floral characters *viz.*, rachis length and number of florets per spike were found significant. Tuberose bulb yield in the case of clumps weight tonne per hectare was also found significant and 200 kg phosphorus per hectare recorded the higher values.

Key words: Bulb, nitrogen, phosphorus, spacing.

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Introduction

Tuberose (*Polianthes tuberosa* Linn.) is an predominant or key bulbous flowering perennial ornamental plants. It is commonly called as 'Rajani Gandha' and is native of Mexico. It has been obtain or secure considerable popularity and widely grown for aesthetic aromatic and commercial purpose. It produces waxy, white and fragrant flowers on long spikes which are mostly used as cut flowers for making garlands and with extracting essential oil. It is commercially cultivated in West Bengal, Tamil Nadu, Maharashtra, Karnataka and Uttar Pradesh and

Punjab. It blooms profusely or profoundly almost throughout the year and more artistic garland and floral arrangements with the fully fragrance are made from its tuberose flowers.

The choicest with most favourable or advantageous or finest supply of plant nutrients is an important factor in growth and flowering in tuberose during cultivation. The field should be well prepared by 2-3 ploughing and incorporation 40-50 tonnes per hectare of well rotten farmyard manure before planting time *i.e.*, during February-March. The tuberose bulbs planting are done in March-April at the different distance. Bulb weighing about 40-50

g is suitable for planting for the production of healthy spikes. The fertilizers during crop are done to be fertilized with quantity of N, P & K. It requires being sufficient condition soil moisture for its growth and bulb production of plants. The weekly irrigation is required during May to June in Western Uttar Pradesh. In clayey, slightly sandy loam soil, the fast multiplication of daughter bulbs is satisfactory and with acceptable. One mother bulb gives rise to 06 – 08 daughter bulbs in period of growth, respectively. Out of which 45 per cent bulbs are fit for the next planting. It's magnificent and with inspiring delight cultivation of tuberose is influenced by various agro- techniques including most excellent spacing.

Materials and Methods

The study was conducted for two year during 2014-15 and 2015-16 at Research Farm, Crop Cafeteria Unit (CCU) of Krishi Vigyan Kendra, Hastinapur, Sardar Vallabhai Patel University of Agriculture & Technology, Meerut (UP). The soil of trail site was clayey, slightly sandy in reaction with P^H 7.5 and having EC value of 0.37 ds/m. The fertility status of trail plot was medium in organic carbon as well as available phosphorus and potassium. The trail was conducted in a Randomized Complete Block Design (CRBD) with involve three stages of nitrogen (100, 150 and 200 kg/ha) and phosphorus (100, 150 and 200 kg/ha) and two spacing differs *i.e.*, 10 x 20 cm and 20 x 20 cm. Thus, total 27 treatments combinations were included with three replications. A fixed basal dose of 2.5 kg/ m² of well vermin compost were incorporation into the soil at the time of field preparation. Nitrogen levels as per treatments were applied in three equal splits in the form of urea. One third of nitrogen, entire quantity of phosphorus in the form of single super phosphate and the potassium at the rate of 120 kg/ha in the form of potash were applied as a basal dose at the time of tuberose bulb planting.

To the remaining two doses of nitrogen were given as a top dressing *i.e.*, one third at 30 days after planting and now the remaining one third at 90 days after planting. The bulbs were pre-treated with 0.15 percent Hexaconazole 5% SC uniformly to present any fungal infection. Bulbs of uniform size (2.0 to 2.5 cm diameter) were planted a depth of 5 cm in the month of March, 2014-15 as well as in 2015-16. To the observations were made on various vegetative growth and flowering characters were recorded for a treatments evaluation. The data collected were analyzed using statistical method as suggested by Gomez and Gomez (2010). Two year data were statistically analyzed and presented in Table 1.

Results and Discussion

The objective wise facts and findings derived after analysis of the data have been presented under the following heads:

Vegetative growth characters

To the application of nitrogen significantly include plant height and number of leaves per plant (Table 1). The maximum plant height (49.03 cm) and number of leaves per plant (48.13 cm) were recorded under 200 kg of nitrogen/ha treatment as compared to lower level of nitrogen (100 kg/ha) in the pooled results. The plant height and number of leaves per plant increased with the application of high dose of nitrogen because nitrogen is an essential part of nucleic acid, which play a important role in promoting the plant growth. While, the given response of phosphorus and spacing was found to be non significant with the regard to plant height. In case of number of leaves per plant, the response with phosphorus was found to be significant. The increases in plant height and number of leaves per plant with the nitrogen application have also been reported by Banker and Mukhopadhyay (1985) and Jana *et al.*, (1986).

The numbers of days need to first flowering were significantly affected due to varying levels of nitrogen. Minimum number

of days need to first flowering under 200 kg N/ha while it was maximum under 100 kg/ha treatment. The number of days required for flowering decreased with the increasing level of nitrogen. Similar, obtained results were also reported by Sharma and Mohammad (2004) in the crop. N application including earlier flowering might be assigned to higher dose supply of N, which results in the early completion of vegetative period. To the

application of P₂O₅ had non-significant effect a number of days to flowering. With the respect to spacing, the response of were significantly. The closer spacing (10x20cm) flowered earlier as compared to wider spacing (20 x 20 cm). These finding are in closer agreement with Singh *et al.*, (2002) who reported that tuberose plants having wider spacing flowered late in both years.

Table 1: Response of nitrogen, phosphorus and spacing on vegetative growth and spike yield/ ha in tuberose cv. Single.

Treatments	Plant height (cm)	Number of leaves/ plant	Number of days to flowering	Spike yield/ ha (No.)		
				2014-15	2015-16	Polled
Nitrogen (Kg/ha)						
100	42.12	41.76	138.92	137510	146617	142064
150	45.38	44.08	132.60	148750	159550	154150
200	49.03	48.13	120.52	161860	178890	170375
CD.(P=0.05)	1.46	0.85	0.45	15062	16007	10183
Phosphorus (Kg/ha)						
100	43.91	41.71	122.36	157520	165940	161730
150	45.01	43.82	119.51	164710	173901	169306
200	48.23	46.78	116.73	175917	176116	176017
CD.(P=0.05)	NS	0.72	NS	NS	NS	80441
Spacing (cm)						
10x10	46.02	44.61	112.47	190604	189417	190011
20x20	47.85	46.74	126.29	178550	176420	177485
CD.(P=0.05)	NS	NS	7.27	12710	13519	70802

Floral Characters

All these flowering characters increased with the level of N salt. The higher length of spike and rachis length, number of florets per spike and number of spike per plant (2) were recorded under the 200 kg N/ha treatment as compared to 100 kg N/ha. To nitrogen application increased spike and rachis length and number of spike per plant, might be attributed to maximum dose of N, which results in completion of vegetative phase early. Tuberose is promotes more vegetative growth by increasing the amount of assimilates that are needed for improvement in length of spike and rachis. The results of the present study also confirm the findings of Sharma and Mohammad (2004) in crop.

Significantly the maximum (170375) and the minimum number of spikes per hectare (142064) were recorded with the treatment of 200 and 100 kg N/ha, respectively, similar trend was also observed with respect to bulb yield tonne/ha.

All the flowering characters were made significant except spike length with regard to the phosphorus application. Spike and bulb yield were found significant in merge or amalgamate results and phosphorus @ 200 kg / ha recorded the maximum spike yield of 169306 spikes per hectare, which was remained at par with 200 kg/ ha. Similar results have been noted by Singh and Godara (1998) and Nair *et al.*, (2000). While

improvement in bulb yield per hectare with the treatment of NPK fertilizers doses have also been reported by Mukhopadhyay and Bankar (1986), Singh and Sujatha (1990).

With due to regards to spacing applications all the following characters were found to be non significant. The highest spikes per hectare (190011) and bulb yield (44.09 t/ha) were significant observed in the closer spacing of 10 x 20 cm, while the wider spacing (20x20 cm) a minimum number of spikes per hectare (177485) and bulb production (35.96 t/ha). The more spike production per unit area due to respect of closer spacing might due to the simple fact is that more number of plants per unit area were accommodated and most of them have produced flowering spikes production. Similar results have been reported by Singh (10) in tuberose.

Conclusion

To the application of nitrogen at 200 kg/ ha recorded significantly the highest value of vegetative and floral parameters. The number of days to first flowering was earlier at higher level of nitrogen. The response of phosphorus was non- significant on vegetative characters while floral characters viz., rachis length and number of florets per spike were found significant. Tuberose bulb yield in the case of clumbs weight tonne per hectare was also found significant and 200 kg phosphorus per hectare recorded the higher values.

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