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Response of time of planting and nitrogen on growth and flower yield of tuberose (*Polyanthes tuberosa* L.) cv. Colcatta 'double'

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Abstract
An experiment was conducted at horticulture farm, RRS., Agwanpur, Saharsa to standardize the time of planting and nitrogen requirement of tuberose cv. "Calcutta double" in a factorial randomized block design with three replications. In this experiment 3 dates of planting (15th February, 15th March, 15th April) and 4 levels of nitrogen (0, 150, 200, 250 kg/ha) were applied. The results indicated that 15th April planting date and application of nitrogen 250 kg/ha recorded maximum vegetative growth, yield and floral characters. However a dose of 250 kg/ha was found optimum for better growth and flowering in tube rose cv. "Colcatta Double".

Keywords: Nitrogen, tuberose, yield, floral characters and growth etc.

Introduction
Tuberose (*Polianthes tuberosa L.*) cv. COLCATTA 'double' is an important commercial bulbous flower crop and it is widely grown for aesthetic as well as medicinal purpose in India. Commercial cultivations of tuberose is mainly confined to Tamilnadu, West Bengal, Karnataka and Maharashtra. However, in Northern India, tuberose cultivation is also gaining popularity with the flower growers. In Bihar it is grown only limited area in Saharsa district. The growth and yield of tuberose plant is significantly influenced by various factors such as application of plant nutrients, optimum time of planting, cultural practices and improved cultivars. Among these, application of nitrogen is an important factor, which highly influences the vegetative growth and flowering. Maiti (1999) [4] reported that nitrogen is essential for promoting growth and higher production of spikes and flowers of tuberose. Similarly, the time of planting influences the growth and flower production of tuberose and a great variation in time of planting in different parts of country has been reported (Nambisan and Krishnan 1983, Sharga, 1999) [5, 8]. Hence, with a view to determine the response of nitrogen and to find out the optimum time of planting for tuberose in Northern part of Bihar, the above-mention study was taken up.

Materials and Methods
The present experiment was conducted over two successive years (2018 and 2019) at the experimental farm of department of horticulture, RRS., Agwanpur, Saharsa in a factorial randomized block design with three applications. The experiment consisted of 12 treatment combination with three dates of planting (15th February, 15th March and 15th April) and Four levels of nitrogen (0, 150, 200, 250 kg/ha). Bulbs of tuberose cv. "Colcatta double" (2.5 - 3.20 cm diameter) were planted at 5 cm depth in a plot size 1.5 * 1 m at 25 * 20 cm apart. Well rotten farm yard manure was applied at the rate of 5 kg/plot with 24.25 g SSP/m^2 and 13.38 g potash/m^2, before planting. The nitrogen was applied in the form of urea in three equal split doses. First dose of nitrogen at the time of planting and the remaining dose of nitrogen were applied after 35 days and 65 days of planting of bulbs.
Observations were recorded from the five randomly selected plants in each experimental plot. The data were recorded on height of plant (longest leaf from the ground level to tip of the leaf), number of leaves per plant, number of days required to emergence of spike, length of spike and rachis, number of florets per spike, number of spike per plant, weight of florets per spike, weight of floret and number of spike per hectare. The data were statistically analyzed using 'Analysis of Variance.

Table 1: Response of time of planting and nitrogen on vegetative growth of tuberose cv. "Colcatta Double".

Treatments	Plant Height (cm)		Number of leaves/plant	
	2018	2019	2018	2019
Time of planting				
T_1 (15th Feb.)	61.37	64.15	64.23	69.67
T_2 (15th March)	63.79	66.09	71.21	75.63
T_3 (15th April)	65.82	68.38	76.37	81.72
SEm +-	1.31	1.40	1.48	1.40
C.D. at 5%	NS	NS	4.30	4.02
Nitrogen				
N_0 (0kg/ha)	49.92	51.96	52.92	56.21
N_1 (150Kg/ha)	59.22	61.48	67.95	72.61
N_2 (200 Kg/ha)	70.63	74.32	79.66	85.37
N_3 (250 Kg/ha)	74.05	78.23	82.62	89.20
SEm +-	1.51	1.62	1.70	1.60
C.D. at 5%	4.38	4.73	4.97	4.63

Table 2: Response of time of planting and nitrogen on floral characters of tuberose cv. "Colcatta Double".

Treatments	No. of spikes florets/spikes		Weight of florets (g)		Weight of (thousand) (g)		No. of spikes/ha	
	2018	2019	2018	2019	2018	2019	2018	2019
Time of planting								
T_1 (15th Feb.)	1.32	1.37	80.69	88.35	2.31	2.37	263.29	273.31
T_2 (15th March)	1.35	1.41	82.77	91.79	2.27	2.39	270.21	281.65
T_3 (15th April)	1.41	1.45	84.66	92.43	2.33	2.43	80.12	293.37
SEm+-	0.04	0.06	1.50	2.12	0.03	0.04	6.72	10.61
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
Nitrogen								
N_0 (0kg/ha)	1.06	1.12	61.42	68.49	2.13	2.20	211.13	222.21
N_1 (150Kg/ha)	1.30	1.35	78.49	86.06	2.27	2.38	255.46	271.13
N_2 (200Kg/ha)	1.51	1.56	93.47	101.47	2.40	2.51	300.11	311.12
N_3 (250Kg/ha)	1.61	1.71	98.23	108.02	2.51	2.57	318.25	327.17
SEm+-	0.04	0.07	1.73	2.40	0.03	0.03	7.81	12.18
C.D. at 5%	0.12	0.18	5.07	7.13	0.07	0.09	22.82	35.79

Table 3: Response of time of Planting and nitrogen on floral characters of tuberose cv. "Calcutta Double"

Treatments	No. of days to emergence of spike		length of spike (cm)		length of rachis (cm)		No. of florets/spike	
	2018	2019	2018	2019	2018	2019	2018	2019
Time of planting								
T_1 (15th Feb.)	171.47	155.82	68.07	69.54	25.82	26.08	35.17	37.19
T_2 (15th March)	144.03	127.65	69.45	71.77	26.26	26.36	35.51	37.59
T_3 (15th April)	115.96	101.29	71.31	73.04	26.91	26.69	36.33	37.75
SEm +-	1.87	1.59	1.20	1.20	0.56	0.52	0.41	0.59
C.D. at 5%	5.43	4.62	NS	NS	NS	NS	NS	NS
Nitrogen								
N_0 (0Kg/ha)	155.12	138.38	58.35	58.69	21.82	22.49	28.93	30.67
N_1 (150Kg/ha)	146.17	130.11	67.71	69.51	24.53	24.77	34.45	36.13
N_2 (200Kg/ha)	139.60	124.22	74.85	77.23	28.55	28.77	9.22	40.92
N_3 (250Kg/ha)	137.02	121.22	78.23	81.02	31.32	30.12	41.03	42.41
SEm+-	2.14	1.81	1.37	1.38	0.67	0.61	0.46	0.67
C.D. at 5%	6.27	5.36	4.05	4.04	1.96	1.74	1.36	1.95

Results and Discussion

The results depicted in table 1 to 3 reveal that the application of nitrogen influenced almost all growth and flowering characters appreciably but the effects of time of planting were not reflected on these parameters. The height of the plant and the number of leaves per plant increased significantly due to various nitrogen levels. The maximum height of plant 74.05 cm and 78.23 cm and number of leaves of 82.62 and 89.20 in 2018 and 2019 respectively were recorded at N3 treatment which was closely followed by N2 treatment without showing significant variation. The minimum of 49.92 cm and 51.96 cm plant height and 52.92 and 56.21 leaves was recorded in control (No) during 2018 and 2019 respectively. Similarly T_3 treatment (15th April) recorded maximum number of leaves (76.37 and 81.72/plant) over T_1 and T_2 treatment. The favorable effect of N in promoting growth of plant might be due to the fact that N applications improving nutritional status and role played by N as being constituent of protein and component of protoplasm favorably affecting chlorophyll contents in leaves, which could have resulted in better vegetative growth. Similar results were also obtained by Bankar and Mukhopadhyay (1990) [1] and Parmar and Chundawat (1992) [6]. According to hartsema (1961) [2] when the data is not significant there is no need for discussion for the date of planting temperature is the most important factor affecting growth of bulbous plant. Thus, April (T_3) planting promoted the number of leaves. Yadav and Bose (1988) [11] revealed that planting of the bulbs in the month of April

recorded the maximum vegetative growth.

The time of planting failed to exert significant effect on various floral characters of tuberose except for number of days to emergence of spike. It was observed that the plant flowered earliest (115.96 and 101 days) in both the years when bulbs planted during April (T_3 treatment). The possible explanation for early flowering in April planting might be due to that high temperature increased the rate of photosynthesis and thus improved C:N ratio, which ultimately might have resulted in early initiation of floral bud. The results are in accordance with the findings of Yadav and Bose (1988) [11] Khobragada *et al*. (1997) [3] who reported that planting bulbs at early date (April) significantly induces early flowering in tuberose.

Application of nitrogen significantly influenced various floral characters of tuberose cv. Colcatta 'double' (Table 2 and 3). Nitrogen at N3-level induced flowering in minimum days (137.02 and 121.22) as compared to maximum (155.12 and 138.38 days) at No treatment in both the years i.e., 2018 and 2019. This might be due to the application of nitrogen at optimum level which leads to the completion of vegetative phase earlier followed by accelerated protein synthesis and development of floral primordia. However, no significant difference was observed between N3 and N2 with respect to days to flowering in the present investigation. The maximum length of spike (78.23 cm and 81.02 cm) and length of rachis (31.32 cm and 30.12 cm) were produced by the application of N3 level in both the years, but it was statistically identical with N2 level. This findings may be attributed to higher supply of nitrogen which might have help in increasing the vegetative growth leading to the more amount of assimilates that are needed for improvement in length of spike and rachis. These results are agreement with the findings of Sunil Kumar and Singh (1998) [10] and Singh and Godara (1998) [9]. Similarly, application of nitrogen at N3 level significantly increased the number of florets per spike (41.03 and 42.41), weights of individual's floret (2.51 and 2.57g) and total weight of florets (98.23 and 108.02g) per spike as compared to control (No) in the year 2018 and 2019. The reason for the above results may be that high level of nitrogen increased synthesis of amino acid and chlorophyll formation and better carbohydrates transformation which in turn resulted in better growth and length of rachis thereby producing more florets per plant. The weight of florets per spike also increased which might be due to greater synthesis of carbohydrates and their translocation to flowering stalk. These findings are in consonance with the results of Bankar and Mukhopadhyay (1990) [1] and Singh and Godara (1998) [9].

The maximum number of spike per plant (1.61 and 1.71) and per hectare (318.25 and 327.17 thousands) were produced by the application of 250 kg N/ha (N3), which were at par with N2 level, where is minimum was obtained in plants grown without nitrogen i.e., control (Table 3) in 2018 and 2019. The reason for increasing number of spikes at higher dose of nitrogen treatment might be due to the fact that nitrogen being a constituent of protein is essential for formation of protoplasm which ultimately resulted in the emergence of new shoots and in turn induce more number of spikes. These findings are in conformity with Bankar and Mukhopadhyay (1990) [1] and Parthiban and Khader (1991) [7].

Conclusion

The findings of the present investigation concludes that the reapplication of nitrogen 250 kg/ha recorded maximum vegetative growth, yield and floral characters. However a dose of 250 kg/ha was found optimum for better growth and flowering in tube rose cv. "Colcatta Double".

References

1. Bankar GJ, Mukhopadhyay A. Effect of NPK on growth and flowering in tuberose cv. "ColcuttaDouble". Indian J hort. 1990;47(1):120-126.
2. Hartsema AM. In: Encyclopedia of plant physiology (ed. W. Ruhland). Springer-Verlag, Berlin, 1961.
3. Khobragada RI, Damke MM, Jadhao BJ, Hedau CV. Effect of planting time and spacing on growth, flowering and bulb production of tuberose cv. 'single'. PKV Res. J 1997;21(1):44-47.
4. Maiti RG. Tuberose. In: T.K. Bose, R.G.Maiti, R.S. Dhua, P. Das., eds. Floriculture and Landscaping. Calcutta, India: Naya Prakash, 1999, 505-514.
5. Nambisan KMP, Krishnan BM. Better cultural practice for high yield of tuberose in South India. Indian Hort 1983;28 (3):17-20.
6. Parmar PB, Chundawat BS. Nutritional studies on tuberose (*Polianthes tuberosa L*.) cv. 'Double' In: Abs Proc. National seminar on Commercial Floriculture in India: Present and Potential, Bangalore 1992;03:68.
7. Prathiban S, Khader MA. Effect of N, P and K on yield components and yield in tuberose. South Indian Hort 1991;39(6):363-367.
8. Sharga AN. Tuberose NBRI Bulletin 1999;5:11.
9. Singh Amarjeet, Godara NR. Effect of nutritional requirement of tuberose cv. 'Single' on flower yield characters. Haryana Agril. Univ. J Res 1998;28(1):15-20.
10. Sunil Kumar, Singh RP. Effect of nitrogen, bulb size and plant density on growth, flowering and yield of tuberose (Polianthes tuberose a.). J Ornamental Hort. (New Series) 1998;1(1):6-10.
11. Yadav LP, Bose TK. Improved flower agro-techniques of flower production in West Bengal. Farmer and Parliament 1988;23(2):15-16.