IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Effect Of N, P And K On Tuberose (*Polianthes Tuberosa* L.) Flower Production Cv. Double

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Abstract: An investigation was carried out for three years to study the effect of N (50, 100 and 150 kg/ha), P (25 and 50 kg/ha) and K (25 and 50 kg/ha) on tuberose (*Tuberosa polianthes* L.) flower production cv. Double. Application of N @ 150 kg/ha along with P_2O_5 @ 25 kg/ha signifcantly produced maximum number of leaves per plant (28.38), improved flower quality i.e., (spike length (83.02 cm), number of florets per spike 24.92), number of spikes per plant (2.55), number of spikes per plot (61.11), number of spikes per hectar e(3.770 lakh) with highest net profit and Cost Benefit Ratio (1:4.38). However application of P_2O_5 @ 25 kg/ha along with K_2O @ 25 kg/ha produced maximum number of bulbs per clump and number of bulbs per ha (3.52 and 5.18 lakh respectively).

Key words: Tuberose, Double, nitrogen, phosphorus, potassium, floral characters, flower yield and bulb yield.

Tuberose (*Tuberosa polianthes* L.) cv. Double, commonly known as rajanigandha, is a selective cut flower because of its sweet fragrance and keeping quality. Its natural shelf life of cut flowers is long (8-15 days) as compared to other flowers. It has more economic potential for cut flower trade and essential oils Sadhu and Bose (4). Besides, flowers are highly valued for preparing garlands and bouquets. Though, it has already in great demand in foreign markets, recently its demand is also increasing in Gujarat state. There are various factors affecting the flower production of tuberose like planting material, water requirement, and plant protection and fertilizer management. Among these all cultivation practices fertilizer management is of utmost important factor which govern the flower yield of tuberose. Very little work has been done on fertilizer management under Saurashtra conditions and farmers do not have standard cultivation practices including fertilizer or nutrient management. This poor management leads to poor yield and quality of flowers. Therefore, the present investigation was carried out to study the effect of N, P, and K on tuberose flower production cv. Double

Materials and methods

The present studies were carried out at research station, Department of Botany and Horticulture, Yeshwant Mahavidyalaya, Nanded, Maharashtra with three levels of N, i.e., N_1 (50 kg/ha), N_2 (100 kg/ha) and N_3 (150 kg/ha), two levels of P i.e., P_1 (25 kg/ha) and P_2 (50 kg/ha) and two levels of K i.e., K_1 (25 kg/ha) and K_2 (50 kg/ha) and control (15t FYM/ha). The experiment was laid out in Factorial Randomized Block Design with three replications per treatment. The size of gross plot and net plot was 2.25 m x 1.5 m and 1.35 m x 1.2 m, respectively. Half dose of nitrogen and full dose of phosphorus and potash was applied at the time of planting and remaining dose of nitrogen was applied at spike emergence. The data for growth parameters, flower characteristics, flower yield and bulb yield work taken during the three years of experiment and pooled analysis was done as per method of Panse and Sukhatme (2).

Results and discussion: -

The three year results revealed that different N, P, K levels and their interactions influenced the growth, floral characteristics, flower yield and bulb yield significantly.

The number of leaves per plant (27.75), Length of spike (84.11 cm.), number of florets/spike (24.45), number of spike/plant (2.50), number of spike per plot (59.83) and number of spike per ha (3.695 lakh) were significantly higher with the application of N at 150 kg/ha. (N_3**)** whereas, lowest number of leaves per plant (21.30), Length of spike (75.74 cm.), number of florets/spike (23.36), number of spike/plant (1.99), number of spike per plot (47.88) and number of spike per ha (2.950 lakh) were observed with control [table 1(a)]. Similar results were observed by Singh and Uma, Sunil Kumar and Singh, (6 and 7, respectively). The interaction effect of N x P was found significant regarding to growth, floral parameters and flower yield. The number of leaves per plant (28.38), Length of spike (83.02 cm.), number of florets/spike (24.92), number of spike/plant (2.55), number of spike/plot (61.11) and number of spike/ha (3.770 lakh) were observed highest under interaction effect of N at 150 kg/ha with P_2O_5 at 25 kg/ha.(N_3P_1). In case of spike length the data was found statistically at par with the interaction of N at 150 kg/ha with P_2O_5 at 50 kg/ha. [table 1(b)]. The results were confirmed through Dahiya *et al*. (1). The vase life of cut flowers was not affected significantly by N, P, K levels and their interactions.

Various nitrogen levels influenced the bulb yield significantly. The highest numbers of bulbs/clump (3.74) were recorded with 150 kg/ha.(N_3) whereas, minimum number of bulbs/clump (2.80) were found in control. The highest number of bulbs per ha. (lakh) (5.54) observed with the application of N @ 150 kg/ha (N_3) whereas, the lowest number of bulbs per ha. (4.15 lakh) observed with control [table 2(a)]. Singh *et al*. (5) reported that increasing nitrogen levels gave the highest bulb production. The interaction effect of P x K on bulb yield was found significant. The maximum number of bulbs/clump and number of bulbs per ha (3.52 and 5.18 lakh respectively) were observed with the application of P_2O_5 and K_2O levels each at 25 kg/ha.(P_1K_1) [table 2(b)]. Combined effect of N, P and K on bulb yield were observed by Patil *et al*. (3).

Phosphorus and Potassium levels did not show significant results individually but Phosphorus along with interaction of nitrogen was found significant on growth, floral parameters and flower yield. Similarly, the interaction effect of P x K was found significant in case of bulb yield.

Economics of different treatments revealed that the highest gross returns (Rs. 1,88,500) and net profit (Rs. 1,45,480) per hectare was obtained under the treatment of N @ 150 kg/ha along with P2O5 @ 25 kg/ha and it was found most economical when cost: benefit ratio calculated (1: 4.38).

Table-1 (a). Effect of N, P and K on growth, floral parameters, flower yield and vase life of tuberose

Treatments	No. of leaves /plant	Length of spike (cm.)	No. of florets/spike	No. of spike/ plant	No. of spike/ plot	No. of spike/ ha(lakh)	Vase life of cut flower(days)
Nitrogen							
N_1	23.91	80.89	23.28	2.16	52.05	3.205	9.29
N_2	25.82	82.16	24.16	2.30	55.44	3.424	8.71
N_3	27.75	84.11	24.45	2.50	59.83	3.695	8.45
S.Em.	0.367	0.320	0.371	0.018	0.431	0.026	0.043
C.D. at 5%	1.444	0.905	1.055	0.051	1.217	0.073	NS
Phosphorus							
P_1	25.75	81.53	24.05	2.34	55.85	3.441	8.79
P_2	25.91	81.24	23.88	2.32	55.70	3.442	8.63
S.Em.	0.112	0.260	0.089	0.015	0.352	0.021	0.063
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
Potassium							
K_1	25.85	80.87	24.04	2.32	55.87	3.447	8.70
K_2	25.81	80.90	23.88	2.32	55.68	3.435	8.73
S.Em.	0.112	0.258	0.088	0.014	0.351	0.021	0.063
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
Control	21.30	75.74	22.36	1.99	47.88	2.950	9.75
S.Em.	0.092	0.241	0.081	0.012	0.301	0.018	0.070
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
N x P	SIG	SIG	SIG	SIG	SIG	SIG	NS
N x K	NS	NS	NS	NS	NS	NS	NS
P x K	NS	NS	NS	NS	NS	NS	NS
N x P x K	NS	NS	NS	NS	NS	NS	NS
C.V.%	3.176	1.403	2.733	4.683	4.634	4.522	5.226

Table-1 (b). Interaction effect of N x P on growth, floral parameters and flower yield of tuberose

Treatments	*No. of leaves/ plant*	*Length of spike (cm.)*	*No. of florets / spike*	*No. of spike/ plant*	*No. of spike/plot*	*No. of spike/ha (lakh)*
$N_1 P_1$	23.40	79.80	23.13	2.19	51.50	3.161
$N_2 P_1$	25.47	81.72	24.08	2.23	54.94	3.391
$N_3 P_1$	28.38	83.02	24.92	2.55	61.11	3.770
$N_1 P_2$	24.43	69.89	23.42	2.14	52.61	3.249
$N_2 P_2$	25.17	80.21	24.25	2.28	55.94	3.457
$N_3 P_2$	26.31	82.75	23.97	2.44	58.55	3.619
S.Em.	0.193	0.453	0.154	0.026	0.609	0.037
C.D. at 5%	0.546	1.280	0.436	0.072	1.722	0.104
C.V.%	3.176	1.403	2.733	40783	4.634	4.522

Table-2 (a). Effect of N, P and K on bulb yield of tuberose

Treatments	No. of bulbs/ clump	No. of bulbs/ha .(lakh)
Nitrogen		
N_1	3.02	4.47
N_2	3.36	4.97
N_3	3.74	5.54
S.Em.	0.032	0.034
C.D. at 5%	0.094	0.102
Phosphorus		
P_1	3.41	5.05
P_2	3.34	4.95
S.Em.	0.026	0.028
C.D. at 5%	NS	NS
Potassium		
K_1	3.39	5.02
K_2	3.35	4.96
S.Em.	0.026	0.028
C.D. at 5%	NS	NS
Control	2.80	4.15
S.Em.	0.021	0.023
C.D. at 5%	NS	NS
N x P	NS	NS
N x K	NS	NS
P x K	SIG	SIG
N x P x K	NS	NS
C.V.%	3.301	3.340

Table-2 (b). Interaction effect of P x K on bulb yield of tuberose

Treatments	*No. of bulbs/clump*	*No. of bulbs/ha .(lakh)*
P_1K_1	3.52	5.18
P_1K_2	3.32	4.74
P_2K_1	3.28	4.88
P_2K_2	3.27	4.88
S.Em.	0.038	0.040
C.D. at 5%	0.108	0.112
C.V.%	3.520	3.340

Table-3. Economics of cut flowers of Tuberose cv. Double

Treatments	Total cost of cultivation	Gross return Rs/ha.	Net profit Rs/ha.	Cost/benefit Ratio
Control	41150	147500	106350	1:3.58
$N_1 P_1$	42090	158500	116410	1:3.76
$N_1 P_2$	42570	162000	119430	1:3.80
$N_2 P_1$	42560	169000	126440	1:3.37
$N_2 P_2$	43030	172500	129470	1:4.00
$N_3 P_1$	43020	188500	145480	1:4.38
$N_3 P_2$	43500	180500	137000	1:4.14

Price of spike: Rs 6.00/dozen. Cost of nitrogen: Rs 9.30 /kg N
Cost of phosphorus: Rs 18.96 /kg P_2O_5 Cost of FYM: Rs 150 / t

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