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Original Research Article

Eminent Flowering Gained via Split Application of NPK

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A B S T R A C T

The present investigation entitled " Eminent flowering gained via split application of NPK" were conducted at the field of Parks and Garden Unit, College of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during kharif season of the academic year 2012-13. The experiment was laid out in Factorial Randomized Block Design with four replications and twelve treatment combinations. The recommended dose of fertilizers was applied in split. The results indicated, in respect of number of florets per spike, weight of florets per spike, per plant and per hectare were found significantly maximum in four split of nitrogen (N_2), two split of phosphorus (P_2), two split of potassium (K_2) and their combinations (N_2P_2 and $N_2P_2K_2$).

Keywords

Split Application, NPK, Flowering

Introduction

Floriculture and landscape architecture is one of the most important branches of Horticulture right from aesthetic to commercial and has a great contribution in the Indian economy value. In India, floriculture industry has gained new heights of popularity and nomenclature in modern agriculture. Today's floriculture is recognized as a lucrative profession with substantially much higher potential for maximum economic returns per unit area than the any other field crops. Nutrients play a major role in the growth and development which increased flower production, quality of flowers and perfection in the form of plants are the important objectives to be reckoned in commercial flower production. Floriculture trade is one of the most rapidly expanding and dynamic global flourished enterprises in today's world scenario. In India, floriculture is mostly considered as a hi-tech industry as India is endowed with diverse eco geographical regions and varied agro climatic conditions, which are most congenial for growing of all kinds of flowers round the year. Tuberose flower has special importance and well known as economical cutflower in International market. There is a constant demand for tuberose flowers throughout the year for various functions, festivals, marriages and floral decorations. The climate of Maharashtra state is most congenial to cultivate this crop in all the three cropping seasons with minimum cost of cultivation.

The growing period of tuberose is normally one year or more. Therefore, a high amount

of organic and inorganic fertilizers are needed to maintain sustainable growth and flowering over a long period. There are many factors which directly affect plant growth and economic yield of tuberose.

Tuberose is a heavy 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 plant growth and flower production in tuberose (Polara *et al.*, 2004). With the increasing demand of tuberose for various purposes, there is a good scope for increasing the production of better quality spikes and bulbs.

Materials and Methods

An experiment entitled, "Eminent flowering gained via split application of NPK" was carried out at Parks and Garden Unit, College of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during kharif season of the academic year 2012-13.

The experiment was laid out in Factorial Randomized Block Design with four replications and twelve treatment combinations.

The recommended dose of fertilizers was applied in split as N_1 (Nitrogen three split applied at the time of planting, 45 DAP and 90 DAP), N_2 (Nitrogen four split applied at the time of planting, 45 DAP, 90 DAP and 135 DAP), P_1 (Phosphorus applied at the time of planting), P_2 (Phosphorus in two split applied at the time of planting and 45 DAP), P_3 (Phosphorus in three split applied at the time of planting, 45 DAP and 90 DAP), K_1 (Potassium applied at the time of planting) and K_2 (Potassium in two split applied at the time of planting and 45 DAP).

Results and Discussion

Influence of nitrogen on flower yield of tuberose

Data in respect of number of florets per spike, weight of florets per spike (g), per plant (g), per plot (kg) and per hectare (t) of tuberose as influenced due to nitrogen exhibited significant results and are presented in Table 1.

The data presented in Table 1 revealed that, the application of nitrogen in four split (N_2) recorded significantly maximum number of florets per spike i. e., 37.17 whereas, minimum was recorded under N_1 (3 split) i. e., 34.13 number. Increase in numbers of florets per spike were happened due to synthesis of amino acid and chlorophyll formation and better carbohydrates transformation which resulted into better growth and maximum length of rachis which ultimately produced more number of florets per spike. This, finding is in agreement with that of Sidhu and Arora (1989) and Munikrishnappa *et al.*, (2004), who reported that increase in nitrogen levels found the maximum florets/spike in tuberose.

Significantly maximum weights of florets per spike (34.72g), weight of florets per plant (172.33g g), per plot (2.757kg kg) and per hectare (19.15t) were produced in N_2 and minimum was recorded in N_1 (3 split) weight of florets i. e., 31.15 g per spike, 143.94g per plant, 2.303kg per plot and 15.99t per hectare. This is might be due to the luxuriant vegetative growth, accumulation of more dry matter and moisture percent under high dose of nitrogen. It ultimately increases the weight of florets. Similar results were also recorded by Mojiri and Arzani (2003), Pandey and Mishra (2005) and Mane *et al.*, (2007) registered that, the application of nitrogen in

split doses were found to increased flower weight in tuberose.

Influence of phosphorus on flower yield of tuberose

The data presented in Table 1, regarding number of florets per spike of tuberose were found to be influenced by split application of recommended dose of phosphorus and exhibited significant effect on number of florets/spike. Maximum number of florets per spike of tuberose was recorded by P_2 (37.74) and minimum was recorded by P_1 (33.19) i.e., basal application.

It is clearly indicated the availability of phosphorus applied under 2 split was fulfilled the requirement of the tuberose crop. This is might be due to the fact that, the phosphorus plays an vital role in energetic of metabolism and biosynthetic reaction which resulted into maximum growth and development of plant and due to this fact plant produced more number of flowers per spike. These results are also supported by the work of Mukhopadhyay and Bankar (1986), Maya (1994), Kawarkhe and Jane (2002) in tuberose.

Maximum weights of floret per spike of tuberose were produced with the application of phosphorus in 2 splits (P_2) i. e., 35.79 g. However, minimum were recorded in P_1 (single split) i. e., 29.58g.

Significantly, maximum weight of floret per plant (186.27g), per plot (2.980kg) and per hectare (20.69t) were produced by P_2 (2 split). However, minimum weight of florets per plant (127.35g), per plot (2.038kg) and per hectare (14.15t) was recorded in P_1 (single split). Similar results were also reported by Gupta *et al.*, (2006), Patel *et al.*, (2008), and Sultana *et al.*, (2006) in tuberose.

Influence of potassium on flower yield of tuberose

Data presented in Table 1 regarding influence of potassium on number of florets per spike indicated that, application of potassium in 2 split had recorded maximum number of florets i.e., 36.43 and minimum was recorded in K_1 (34.86).

Significantly maximum weight of florets 33.61g per spike, weights of florets per plant (164.29g), per plot (2.629kg) and per hectare (18.25t) were produced by K_2 (2 split). However, minimum weight of florets 32.25 g per spike weights of florets per plant (151.99g), per plot (2.432kg) and per hectare (16.89t) were recorded in K_1 (single split).

Interaction effects of N x P on flower yield of tuberose

Data presented in Table 2 indicated that, the application of N x P notified to produce maximum number of florets per spike in tuberose. Maximum number of florets per spike of tuberose were registered by the combination of N_2P_2 (4 split of N and 2 split of P) i. e., 40.03 and minimum was recorded in N_1 P_1 (3 split of N and basal application of P) i. e., 32.45.

Weight of florets of tuberose were significantly influenced due to the application of combination of N x P. Maximum weight of florets per spike of tuberose were registered by the combination of N_2P_2 (4 split of N and 2 split of P) i. e., 38.10g and minimum was found in combination of N_1 P_1 (28.88g). Maximum weight of floret per plant (194.39g), per plot (3.110 g) and per hectare (21.59 t) was produced if nitrogen and phosphorus applied in combination of N_2P_2. However, minimum weights of floret per plant (113.80) per plot

(1.821 kg) and per hectare (12.64 t) were recorded in combination of N_1P_1. Similar results were also reported by Hameed and Sekar (1999) during the fertilizer studies of marigold.

Table.2 Interaction effects of N x P on number of floret of tuberose

	Number of florets			**Weight of florets per spike (g)**		
	2012-2013			**2012-2013**		
N x P	**P_1**	**P_2**	**P_3**	**P_1**	**P_2**	**P_3**
N_1	32.45	35.45	34.48	28.88	33.47	31.09
N_2	33.93	40.03	37.55	30.27	38.10	35.78
'F' Test	Sig.			**Sig.**		
SE (m) ±	0.216			0.216		
CD at 5%	0.623			0.622		
	Weight of florets per plant (g)			**Weight of florets per plot (kg)**		
N_1	120.73	165.72	145.38	1.932	2.652	2.326
N_2	133.98	206.82	176.20	2.144	3.309	2.819
'F' Test	**Sig.**			**Sig.**		
SE (m) ±	1.868			0.030		
CD at 5%	5.379			0.086		
	Weight of florets per hectare(t)					
N_1	13.41	18.41	161.53			
N_2	14.88	22.98	195.78			
'F' Test	**Sig.**					
SE (m) ±	0.208					
CD at 5%	0.598					

Table.3 Interaction effect of N x P x K on flower yield of tuberose

	number of florets per spike	**weight of florets per spike (g)**	**weight of florets per plant (g)**	**weight of florets per plot (kg)**	**weight of florets per hectare(t)**
Interaction (N x P x K)	**2012-2013**	**2012-2013**	**2012-2013**	**2012-2013**	**2012-2013**
$N_1P_1K_1$	31.95	28.00	112.00	1.792	12.45
$N_1P_1K_2$	32.95	29.76	129.45	2.071	14.38
$N_1P_2K_1$	34.65	33.19	162.67	2.603	18.08
$N_1P_2K_2$	36.25	33.75	168.77	2.700	18.75
$N_1P_3K_1$	33.45	29.95	139.27	2.228	15.47
$N_1P_3K_2$	35.50	32.23	151.49	2.424	16.83
$N_2P_1K_1$	32.75	29.63	130.40	2.086	14.49
$N_2P_1K_2$	35.10	30.91	137.57	2.201	15.29
$N_2P_2K_1$	39.25	37.20	197.16	3.155	21.91
$N_2P_2K_2$	40.80	39.00	216.48	3.464	24.05
$N_2P_3K_1$	37.10	35.53	170.43	2.727	18.94
$N_2P_3K_2$	38.00	36.03	181.97	2.912	20.22
'F' Test	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.306	0.306	2.642	0.042	0.294
CD at 5%	0.881	0.880	7.606	0.122	0.845

Table.1 Influence of nitrogen on flower yield of tuberose

	Number of florets	Weight of florets per spike (g)	Weight of florets per plant (g)	Weight of florets per plot (kg)	Weight of florets per hectare(t)
Splits of nitrogen					
N_1	34.13	31.15	143.94	2.303	15.99
N_2	37.17	34.72	172.33	2.757	19.15
'F' Test	Sig.	**Sig.**	**Sig.**	**Sig.**	**Sig.**
SE (m) ±	0.125	0.125	1.079	0.017	0.119
CD at 5%	0.360	0.359	3.105	0.050	0.345
P_1	33.19	29.58	127.35	2.038	14.15
P_2	37.74	35.79	186.27	2.980	20.69
P_3	36.01	33.43	160.79	2.573	17.87
'F' Test	Sig.	**Sig.**	**Sig.**	**Sig.**	**Sig.**
SE (m) ±	0.153	0.153	1.321	0.021	0.147
CD at 5%	0.441	0.440	3.803	0.061	0.423
Splits of potassium					
K_1	34.86	32.25	151.99	2.432	16.89
K_2	36.43	33.61	164.29	2.629	18.25
'F' Test	Sig.	**Sig.**	**Sig.**	**Sig.**	**Sig.**
SE (m) ±	0.125	0.125	1.079	0.017	0.119
CD at 5%	0.360	0.359	3.105	0.050	0.345
Interaction of N x P					
'F' Test	Sig.	**Sig.**	**Sig.**	**Sig.**	**Sig.**
SE (m) ±	0.216	0.216	1.868	0.030	0.208
CD at 5%	0.623	0.622	5.379	0.086	0.598
Interaction of P x K					
Test	N.S.	**N.S.**	**N.S.**	**N.S.**	**N.S.**
SE (m) ±	0.216	0.216	1.868	0.030	0.208
Interaction of N x K					
'F' Test	N.S.	**N.S.**	**N.S.**	**N.S.**	**N.S.**
SE (m) ±	0.177	0.176	1.525	0.024	0.169
Interaction of N x P x K					
F' Test	Sig.	**Sig.**	**Sig.**	**Sig.**	**Sig.**
SE (m) ±	0.306	0.306	2.642	0.042	0.294
CD at 5%	0.881	0.880	7.606	0.122	0.845

Interaction effects of N x K and P x K on flower yield of tuberose

The data presented in Table 1 revealed that, an interaction effects of N x K and P x K during the study was found to be non-significant.

Interaction effect of N x P x K on flower yield of tuberose

Interaction effects of NPK were found to be significant during the study (Table 3). Application of N_2P_2 along with K_2 had registered maximum number of florets per spike of tuberose i. e., 40.80 and minimum number of florets per spike was recorded under combination of $N_1P_1K_1$ (31.95).

Interaction effects of NPK were found to be significant during the study. Application of N_2P_2 along with K_2 registered maximum weight of florets per spike of tuberose (39.00g) which was followed by the

combination of N_2P_2 along with K_1 (37.20g). However, minimum weight of florets per spike of tuberose was recorded by $N_1P_1K_1$ (28.00g). The combination $N_2P_2K_2$ recorded significantly maximum weight of floret per plant (216.48g), per plot (3.464kg) and per hectare (24.05t). Whereas, minimum was obtained under the combination $N_1P_1K_1$ per plant (112.00g), per plot (1.724 k1.792kg g) and per hectare (1.792kg) of tuberose. This might be due to fact that, application of NPK together at proper time and growth stage of plant and also due to sufficient quantity supply of these essential seems to nutrients helpful for improving photosynthesis, cell division, root growth and ultimately plant growth is stimulated may contributed to increase weight of flowers. This result is in accordance with the results recorded by Mukhopadhyay and Bankar (1985) in tuberose, Venkatraman (2002), Sherawat *et al.,* (2003) in gladiolus.

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