

Response of nitrogen, phosphorus and potash on growth and flower production of chrysanthemum (*Chrysanthemum morifolium* Ramat) cv. IIHR-6

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ABSTRACT

The experiment was carried out at the Department of Horticulture, B. A. College of Agriculture, AAU, Anand to study the effect of nitrogen (100, 200, 300 kg/ha), phosphorus (0, 100 kg/ha) and potash (0, 100 kg/ha) on growth and flower production in chrysanthemum cv. 'IIHR-6' in RBD factorial during 2005-06, 2006-07 and 2007-08. There were twelve treatment combinations. The results revealed that the maximum plant height (56.85 cm) was recorded with treatment N₁ (100 kg/ha). The significantly maximum plant height (56.78 cm) was recorded with treatment P₁ i.e. no phosphorus (0 kg/ha). The different levels of potash on plant height were found non-significant. In respect to plant spread, significantly maximum plant spread (1237 sq.cm) were recorded with nitrogen level N₂ (200 kg/ha) in pooled, while maximum plant spread (1208 sq. cm) was found with treatment P₁ (0 kg/ha). The significantly maximum plant spread (1151 sq. cm) was recorded with K₁ (0 kg/ha) which was at par with K₂ (100 kg/ha). The maximum number of flowers/plant (36.94) was recorded with the nitrogen level N₁ (100 kg/ha) during the year 2005-06. while during the year 2007-08 it was maximum (44.08) with nitrogen level N₃ (300 kg/ha) which was at par with N₂ level (200 kg/ha) during the same year, while it was found non-significant in 2006-07 and in pooled. The significantly maximum flower yield i.e. 12953 and 11041 kg/ha was recorded with the nitrogen level N₂ (200 kg/ha) during the year 2006-07 and 2007-08, respectively.

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Chrysanthemum is one of the most widely cultivated garden flowers and ranks second in popularity next to rose. Its flowers are in great demand throughout the world. It has beautiful range of colour shades, widely different flower shape and height range as chrysanthemum. A nutrition plays an important role for higher and better quality of flowers. The IIHR-6 cultivars well known for its high yielding capacity and good quality of flowers. Therefore, it requires proper quantities of major nutrients like nitrogen, phosphorus and potash. Very little research based information is available on nutrition aspect of chrysanthemum; therefore, this experiment has been conducted in middle Gujarat conditions. Therefore, the present investigation was carried out with a view to "Response of nitrogen, phosphorus and potash on growth and flower production of chrysanthemum (*Chrysanthemum morifolium* Ramat) cv. IIHR-6".

MATERIALS AND METHODS

The present investigation on "Response of nitrogen, phosphorus and potash on growth and flower production of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. "IIHR-6" was conducted at the College Nursery, Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, Anand during 2005-06,

2006-07 and 2007-08. The experiment was laid out in Factorial Randomized Block Design (RBD) with different treatments comprising of three levels of nitrogen (100, 200, 300 kg/ha), two levels of phosphorus (0, 100 kg/ha) and two levels of potash (0, 100 kg/ha). There were twelve treatment combinations.

Chrysanthemum (*Chrysanthemum morifolium* Ramat.) is generally propagated through suckers. The suckers of "IIHR-6" cultivar were transplanted in the plot at the spacing of 45 x 30 cm. The recommended cultural practices were followed during the experimentation except fertilizer application. Fertilizers were applied as per treatments. The data on plant growth and flower production were recorded and statistically analyzed.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been presented in the following sub heads:

Plant height (cm):

Effect of nitrogen :

The data presented in Table 1 revealed that the individual effect of different levels of nitrogen on plant height was found significant during the year 2005-06 only,

whereas there were non-significant differences observed during the rest of the years as well as in pooled. The maximum plant height (56.87 cm) was recorded with the treatment N₁ (100 kg/ha), which was significantly superior over the rest of the nitrogen levels. These results are in accordance with finding of Patel (1998) and Barman and Pal (1999).

Effect of phosphorus :

The effect of different levels of phosphorus on plant height was found non-significant (Table 1) during all the years; however it was exhibited significant trend in pooled results. The significantly maximum plant height (56.78 cm) was recorded with the treatment P₁ *i.e.* no phosphorus (0 kg/ha) as compared to the P₂ level (100 kg/ha). Similar results were reported by Chauhan (2005) and Lodhi and Tiwari (1993).

Effect of potash :

The different levels of potash on plant height was found non-significant during all the years as well as in

pooled also. These results are in confirmation with finding of Belgaonkar *et al.* (1996) and Barman and Pal (1999).

Plant spread (sq. cm):

Effect of nitrogen :

The results in Table 1 revealed that the different levels of nitrogen on plant spread was found significant during the year 2007-08 and in pooled, while it was found non-significant during the year 2005-06 and 2006-07. The significantly maximum plant spread (1237 and 972 sq. cm) were recorded with nitrogen level N₂ (200 kg/ha) in pooled and during the year 2007-08, respectively. Similar results were reported by Chauhan (2005) and Lodhi and Tiwari (1993).

Effect of phosphorus :

The data presented in Table 1 indicate that the different levels of phosphorus were found significant during the year 2005-06 and in pooled analysis. While it was found non significant during the year 2006-07 and 2007-08. On pooled basis, the treatment P₁ (0 kg/ha) was

Table 1 : Effect of N P K on plant height (cm) and plant spread (sq. cm) of chrysanthemum cv. 'IHR - 6'

Treatments	Plant height (cm)				Plant spread (sq. cm)			
	Year			Pooled	Year			Pooled
	2005-06	2006-07	2007-08		2005-06	2006-07	2007-08	
Effect of N								
N ₁	56.87	58.78	54.90	56.85	1166	1188	708	1020
N ₂	50.95	59.02	54.86	54.94	1308	1433	972	1237
N ₃	51.25	59.70	56.94	55.96	1165	1443	949	1186
S. E. ±	1.24	1.14	1.07	1.29	63.02	89.45	72.70	43.79
C.D. (P=0.05)	3.63	NS	NS	NS	NS	NS	213.24	123.86
Effect of P								
P ₁	53.91	59.69	56.73	56.78	1316	1429	880	1208
P ₂	52.13	58.64	54.41	55.06	1110	1281	872	1088
S. E. ±	1.01	0.95	0.87	0.54	51.46	73.03	59.36	35.75
C.D. (P=0.05)	NS	NS	NS	1.54	150.93	NS	NS	101.13
Effect of K								
K ₁	52.08	58.99	55.58	55.55	1224	1388	840	1151
K ₂	53.97	59.34	55.56	56.29	1201	1321	913	1145
S. E. ±	1.01	0.95	0.87	0.54	51.46	73.03	59.36	35.76
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	101.13
Interaction								
N x P	NS	NS	NS	NS	NS	NS	NS	NS
N x K	NS	NS	NS	NS	NS	NS	NS	NS
P x K	NS	NS	NS	NS	NS	NS	NS	NS
N x P x K	NS	Sig	NS	NS	NS	NS	NS	NS
Y x N	-	-	-	Sig	-	-	-	-
Y x N x P x K	-	-	-	Sig	-	-	-	-
C.V.%	8.08	6.71	6.64	7.14	18.00	22.87	28.75	22.89

NS = Non significant

found significantly superior for maximum plant spread (1208 sq. cm) as compared to the P₂ level (100 kg/ha) of phosphorus. These results are in confirmation with finding of Belgaonkar *et al.* (1996) and Barman and Pal (1999).

Effect of potash :

The different levels of potash on plant spread were found non-significant during all the years (Table 1). However, it was found significant in pooled results. On pooled basis, the significantly maximum plant spread (1151 sq. cm) was recorded with K₁ (0 kg/ha) which was at par with K₂ level (100 kg/ha) of potash. These results are in accordance with findings of Patel (1998) and Barman and Pal (1999).

Number of flowers/plant :

Effect of nitrogen :

The data presented in Table 2 revealed that the different levels of nitrogen on number of flowers/plant was found significant during the year 2005-06 and 2007-08, while it was found non-significant in 2006-07 and in pooled. The maximum number of flowers/plant (36.94)

was recorded with the nitrogen level N₁ (100 kg/ha) during the year 2005-06. While during the year 2007-08 it was maximum (44.08) with nitrogen level N₃ (300 kg/ha) which was at par with N₂ level (200 kg/ha) during the same year. Similar results were reported by Patel (1998) and Lodhi *et al.* (1993).

Effect of phosphorus and potash :

The data (Table 2) revealed that the different level of phosphorus and potash were found non significant during all the experimental years as well as in pooled.

Flower yield (kg/ha):

Effect of nitrogen :

The data presented in Table 2 revealed that the effect of different levels of nitrogen on flower yield (kg/ha) were found significant during all the years. While it was found non-significant in pooled. The significantly maximum flower yield *i.e.* 12953 and 11041 kg/ha was recorded with the nitrogen level N₂ (200 kg/ha) during the year 2006-07 and 2007-08, respectively, and it was at par with nitrogen level N₃ (300 kg/ha) during both the years.

Table 2 : Effect of N P K on number of flowers/plant and flower yield (kg/ha) of chrysanthemum cv. 'IIHR - 6'

Treatments	Number of flowers/plant				Flower yield (kg/ha)			
	Year			Pooled	Year			Pooled
	2005-06	2006-07	2007-08		2005-06	2006-07	2007-08	
Effect of N								
N ₁	36.94	57.71	34.52	43.06	7547	10615	8478	8880
N ₂	27.97	58.82	43.61	43.46	5767	12953	11041	9920
N ₃	29.93	59.69	44.08	44.56	6305	12927	10887	10040
S. E. ±	1.77	1.70	1.86	2.90	379	555	403	762
C.D. (P=0.05)	5.18	NS	5.48	NS	1110	1629	1183	NS
Effect of P								
P ₁	30.65	59.82	40.44	43.64	6393	11623	10445	9487
P ₂	32.57	57.66	41.03	43.75	9989	12706	9826	9739
S. E. ±	1.44	1.39	1.52	0.83	309	454	329	213
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Effect of K								
K ₁	30.89	59.37	40.98	43.75	6353	12280	10318	9650
K ₂	32.34	58.11	40.50	43.65	6725	12050	9952	9576
S. E. ±	1.44	1.39	1.52	0.83	309	454	329	213
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Interaction								
N x P	Sig	NS	NS	NS	NS	NS	NS	NS
N x K	NS	NS	NS	NS	NS	NS	NS	NS
P x K	NS	NS	NS	NS	NS	NS	NS	NS
N x P x K	NS	NS	NS	NS	NS	NS	NS	NS
Y x N	-	-	-	Sig	-	-	-	Sig
Y x N x P x K	-	-	-	Sig	-	-	-	Sig
C.V. %	19.37	10.02	15.89	14.11	20.05	15.82	13.79	16.31

NS = Non significant

However, during the year 2005-06, the flower yield was found maximum (7547 kg/ha) with nitrogen level N_1 (100 kg/ha). These results are in accordance with finding of Chauhan (2005) and Barman and Pal (1999).

Effect of phosphorus and potash :

The data of Table 2 indicated that the different levels of P and K were found non significant for flower yield during all the years as well as in pooled also.

Effect of interaction :

The interaction among different treatment combinations of nitrogen, phosphorus and potash was observed non-significant on vegetative growth and flowering characters. These results are in confirmation with finding of Belgaonkar *et al.* (1998) and Barman and Pal (1999).

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