The Pharma Innovation Journal 2018; 7(6): 373-375

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(6): 373-375

www.thepharmajournal.com
Received: 11-04-2018
Accepted: 14-05-2018

Effect of N, P_2O_5 and K_2O on growth, flowering and seed production of *Zinnia elegans* Cv. gaint flowered mixed

Qazi Altaf Hussain, Zahoor Ahmad, Khalid Rasool, Angrej Ali, NA Ganie and TK Chattopadyay

Qazi Altaf Hussain
Division of Horticulture, Sher-e-Kashmir University of Agriculture Science and Technology of Kashmir, Wadura, Sopore, Jammu and Kashmir, India

Zahoor Ahmad
KVK, Kupwara, SKUAST-K, Jammu and Kashmir, India

Khalid Rasool
Division of Horticulture, Faculty of Agriculture, Sher-e-Kashmir University of Agriculture Science and Technology of Kashmir, Wadura, Sopore, Jammu and Kashmir, India

Angrej Ali
Division of Horticulture, Faculty of Agriculture, Sher-e-Kashmir University of Agriculture Science and Technology of Kashmir, Wadura, Sopore, Jammu and Kashmir, India

NA Ganie
KVK, Kupwara, SKUAST-K, Jammu and Kashmir, India

TK Chattopadyay
Div. of FMAP, FOH, BCKVV, Mohanpur, West Bengal, India

Correspondence
Qazi Altaf Hussain
Division of Horticulture, Faculty of Agriculture, Sher-e-Kashmir University of Agriculture Science and Technology of Kashmir, Wadura, Sopore, Jammu and Kashmir, India

Abstract
A field experiment was carried out to study the effect of N, P2O5 and K2O on vegetative, floral and seed production characters of *Zinnia elegans* cv. Gaint Flowered Mixed at Horticultural Research Station, Mondouri, B.C.K.V., West Bengal in two consecutive seasons (i.e. rainy and winter season). N, P2O5 and K2O each at 100 and 200 kg ha-1 were tested in all possible combinations in Randomised Block Design. Although plant height, number of leaves plant-1 and leaf area plant-1 recorded highest by application of N, P2O5 and K2O each at 200 kg ha-1, however, these remained statistically at par under application of 200 kg N ha-1 + 100 kg P2O5 ha-1 + 200 kg K2O ha-1. Highest number of primary and secondary branches was recorded under a treatment combination of 200 kg N ha-1 + 100 kg P2O5 ha-1 + 200 kg K2O ha-1. Application of 200 kg N ha-1 + 100 kg P2O5 ha-1 + 200 kg ha-1 also resulted in significantly higher number of flowers plant-1, number of seeds flower-1 and seed yield plant-1. Significant decrease in all the characters was observed under control.

Keywords: Effect, N, P_2O_5 K_2O, growth flowering and seed production, *Zinnia elegans* Cv. gaint

Introduction
The demand of quality seeds of annual flowers including Zinnia has always been there as these are easily propagated through seeds. However, the information on various aspects of seed production and nutrient requirements for cultivation of *Zinnia elegans* is scanty. The present investigation was, therefore, undertaken to study the effect of N, P_2O_5 and K_2O on the growth, flowering and seed production characters of *Zinnia elegans.*

Materials and methods
The experiment was carried out in two consecutive seasons (i.e. rainy and winter season) on *Zinnia elegans* cv. Gaint Flowered Mixed at Horticultural Research Station, Mondouri, B.C.K.V., West Bengal. The place is situated at 23°N latitude and 89°E longitude with an average altitude of 9.75 m above mean sea level. The soil texture was clay loam having pH 6.9, organic carbon 0.392%, nitrogen 0.05% and available P and K 22.8 kg ha^{-1} and 95.75 kg ha^{-1}, respectively. The climate was subtropical humid with mean highest and Zinnia can be grown in both the seasons.
The experiment was laid out in RBD with 9 treatment combinations replicated thrice. Different treatments comprised of 2 levels each of N, P_2O_5 and K_2O (100 and 200 kg ha^{-1}) denoted by N_1, N_2, P_1, P_2, K_1 and K_2 used in all possible combinations and compared with control ($N_0P_0K_0$). Seedlings were transplanted in experimental plots when they became 25 days old and the spacing adopted was 50 x 25 cm. Full dose of P_2O_5 and K_2O and ½ N alongwith well rotted FYM @ 30 t ha^{-1} were applied as basal dose and another ½dose of N was applied one month after transplanting. Height, primary branches, secondary branches, number of leaves, leaf area, number of flowers and seed yield $plant^{-1}$, flower dry weight and 100 seed weight were the parameters recorded.

Results and discussion
A. Vegetative characters: Application of nitrogen, phosphorus and potassium significantly improved all the vegetative characters recorded in the study as compared to control. Perusal of Table 1 revealed that 200 kg N ha^{-1} + 200 kg P_2O_5 ha^{-1} + 200 kg K_2O ha^{-1} while remaining statistically at par with 200 kg N ha^{-1} + 100 kg P_2O_5 ha^{-1} + 200 kg K_2O ha^{-1} ($N_2P_1K_2$) recorded the maximum plant height (96.94 cm), number of leaves $plant^{-1}$ (259.91) and leaf area $plant^{-1}$ (20.93 cm^{-2}), however, the highest number of primary branches $plant^{-1}$ (8.49) and secondary

branches plant^{-1} (10.68) was recorded under $N_2P_1K_2$ (200 kg N ha^{-1} + 100 kg P_2O_5 ha^{-1} + 200 kg K_2O ha^{-1}). Plants under control ($N_0P_0K_0$) recorded the lowest plant height (72.27 cm), number of primary branches plant^{-1} (5.30), number of secondary branches plant^{-1} (7.39), number of leaves plant^{-1} (176.64) and leaf area plant^{-1} (14.67). Similar findings have been reported by Blake and Spencor (1962) [2], Eck *et al.* (1962) [3], Freeman and Bing (1968) [4], Jana and Pal (1991), Iresel *et al.* (1998) [5] and Kumar and Kaur (1996) [9].

B. Floral and seed production characters: Data recorded on flowering and seed yield components (Table 2) indicated that application of different combinations of N, P_2O_5 and K_2O exerted significant influence on almost all the parameters as compared to control. The highest number of flowers plant^{-1} (29.06), number of seeds flower^{-1} (141.61), seed weight flower^{-1} (0.995 g) and seed weight plant^{-1} (25.33 g) was observed under $N_2P_1K_2$ (200 kg N ha^{-1} + 100 kg P_2O_5 ha^{-1} + 200 kg K_2O ha^{-1}). However, number of flowers plant^{-1} under $N_2P_1K_2$ remained statistically at par with that $N_2P_2K_1$ and $N_2P_2K_2$ and number of seeds flower^{-1} did not differ significantly than that under $N_2P_2K_2$. The lowest number of flowers plant^{-1} (19.60), number of seeds flower^{-1} (125.07), seed weight flower^{-1} (0.793 g) and seed weight plant^{-1} (15.28 g) was observed under control ($N_0P_0K_0$). 100 seed weight was not effected significantly by application of different combinations of N, P_2O_5 and K_2O. It is obvious that number of flowers is directly related to the number of branches plant^{-1} as defined by Arora and Saini (1976) [1] and the seed yield has direct dependence on the flower number and growth of plants. The performance of plants in terms of growth, flowering and seed production is optimum when the requirement of plants for different nutrients is adequately met. Oberthova (1981) [10] reported that NPK when applied in combination increased seed yield by 24.62% in Zinnia. Strojney *et al.* (1992) [11] also reported that flower yields of *Dianthus* cv. Tanga and Pallas Orange were the highest from plants fertilized with 100 mg N + 25 mg P + 150 mg K litre^{-1}. The results obtained for flower dry weight is in concordance to the results obtained by Jana and Pal (1991) and Jhon and Paul (1999) [7]. Jana and Pal (1991) noticed that application of 200 kg N ha^{-1} alongwith 100kg P_2O_5 ha^{-1} increased the number of seeds flower^{-1} in case of cosmos. The results pertaining to seed weight flower^{-1} are closely similar to the findings reported by Kharchenko (1983) for sunflower. Kumar and Kaur (1996) [9] also reported that in *Impatiens balsamaina* seed yield m^{-2} was highest under 20 g N m^{-1} alongwith 10 g P_2O_5 m^{-2}.

Thus, it can be concluded that application of 200 kg N ha^{-1} + 100 kg P_2O_5 ha^{-1} + 200 kg K_2O ha^{-1} augments seed yield and growth and flowering characters of *Zinnia elegans*.

Table 1: Effect of various combinations of N, P_2O_5 and K_2O on vegetative characters of *Zinnia elegans* cv. Gaint Flower Mixed (pooled over data for the two year of 2014-15)

Treatments	Plant height (cm)	No. of primary branches plant^{-1}	No. of secondary branches plant^{-1}	No. of leaves plant^{-1}	Leaf area plant^{-1} (cm^2)
$N_1P_1K_1$	81.03	6.57	7.09	193.60	16.10
$N_1P_1K_2$	84.03	7.01	8.68	201.15	16.66
$N_1P_2K_1$	85.99	6.76	9.73	220.39	17.95
$N_1P_2K_2$	87.34	6.84	10.09	228.91	18.44
$N_2P_1K_1$	93.42	8.08	10.38	240.65	19.85
$N_2P_1K_2$	93.88	8.49	10.68	259.31	20.35
$N_2P_2K_1$	94.42	8.48	10.13	251.15	20.04
$N_2P_2K_2$	96.94	8.13	10.38	259.91	20.93
$N_0P_0K_0$	72.27	5.30	7.39	176.64	14.67
C.D at 5%	4.01	2.03	2.79	36.97	1.48

Table 2: Effect of various combinations of N, P_2O_5 and K_2O on flowering and seed production characters of *Zinnia elegans* cv. Gaint Flowered Mixed (pooled over data for the two years of 2014-15)

Treatments	No. of flowers plant^{-1}	No. of seeds flower^{-1}	Seed weight flower^{-1} (g)	100 seed weight (g)	Seed yield plant^{-1} (g)
$N_1P_1K_1$	23.58	129.06	0.841	0.686	18.98
$N_1P_1K_2$	24.39	136.52	0.905	0.693	20.40
$N_1P_2K_1$	25.77	133.99	0.875	0.690	19.97
$N_1P_2K_2$	26.41	138.04	0.910	0.700	21.10
$N_2P_1K_1$	26.44	132.67	0.871	0.695	21.47
$N_2P_1K_2$	29.06	141.61	0.995	0.700	25.33
$N_2P_2K_1$	27.44	134.43	0.887	0.693	22.63
$N_2P_2K_2$	27.34	137.49	0.912	0.696	23.36
$N_0P_0K_0$	19.60	125.07	0.793	0.675	15.28
C.D at 5%	2.49	4.19	0.044	N.S	0.68

N.S – Non-significant
N_1 – 100 kg N ha^{-1}, N_2 – 200 kg N ha^{-1}
P_1 – 100 kg P_2O_5 ha^{-1}, P_2 – 200 kg P_2O_5 ha^{-1}
K_1 – 100 kg K_2O ha^{-1}, K_2 – 200 kg K_2O ha^{-1}
$N_0P_0K_0$ - Control

References

1. Arora JS, Saini SS. Response of carnation to various levels of N, P and K fertilization. Journal of Research. 1976; 8(4):362-366.
2. Blake J, Spencor R. Nitrogen status of carnation plants. Nature. 1962; 195:1321-2.
3. Eck P, Campbell FJ, Spellman Af. Effect of nitrogen and potassium fertilizer treatment on soil concentration and on production quality and mineral composition of carnation. Proc. Am. Soc. Hort. Sci. 1962; 80:565-70.

4. Freeman RN, Bing A. Tolerance of carnation to increasing quantities of fertilizer. New York St. Flow. Grs. Bull., No, 1968, 275.
5. Iresel Van MW, Beverly RB, Thomas PA, Latimer JG, Mills HA. Fertilizer effects on the growth of impatients, petunia, salvia and vinca plug seedlings. Hort Science, 1998; 33(4):678-682.
6. Jane BK, Pal A. Response of nitrogen and phosphorus on growth, flowering and seed yield of cosmos cv. Super Sunset. Indian Agriculturist. 1991; 35(2):113-118.
7. Jhon AQ, Paul TM. Response of *Chrysanthemum morifolium* to different levels of nitrogen and phosphorus. Applied Biological Research. 1999; 1(1):35-38.
8. Kharchenko NI. Fertilizer and the dynamics of sunflower seed maturation. Khimiya-v-Selskom-Khozyaistve, No. 1993; 7:19-21.
9. Kumar R, Kaur K. Effect of nitrogen and phosphorus on plant growth, pod number and seed yield in balsam. Journal of Ornamental Horticulture. 1996; 4(1-2):23-26.
10. Oberthova K. Nutrient content of Zinnia plants grown for seed. Acta Fytotechnica. 1981; 37:71-80.
11. Stronjny Z, Kowalczyk W, Marynowska M. Mineral nutrition of carnation cultivated in a greenhouse. *Prace* Instytutu Sandownictwa-I-Kwia-eiarstwan-w Skiernicwicach. 1992; 17:15-21.