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To study the effect of different doses of nitrogen on vegetative growth of Zinnia (*Zinnia linearis* zinn.)

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Abstract

*A field experiment was conducted during the rainy season in two consecutive years (2006 and 2007) to investigate the effect of different doses of Nitrogen on the growth and productivity of Zinnia (*Zinnia linearis *Zinn.) for landscape purpose at the Horticulture Research Farm, R. B. S. College, Bichpuri, Agra. The study comprised of four treatments having different doses of nitrogen. During the investigation parameters such as height of plant, diameter of stem, number of leaves, length and width of the longest leaf, visibility of first floral bud, days of colour break in the first floral bud, days to start of flowering, days to first plucking of floral heads, the period of last plucking of floral heads were observed. It was noted that N_2 treatment having dose of 100kg/hectare nitrogen was found significantly in better position in comparison to all the treatments studied and almost at all stages of observation.*

Keywords: Floral bud, floral heads, nitrogen, productivity

Introduction

The impact of Indian floriculture in the world market will be very high in future due to immense plant biodiversity an d its broad range of value added products Indian floriculture produce is characterized by growing cut flowers crops, loose flower crops, foliage ornamental plants, trees, shrubs and climbers, edge and hedges, annuals, biennials and perennials, indoor plants, quick money spinning crops *viz*. – China aster, dahlia, gladiolus, jasmine, tulip, rose, Zinnia etc. (Ahmad et al., 2007). The floriculture sector is very dynamic and the introduction of new species attracts consumers and provides new options for the producers. In this context, zinnia (*Zinnia elegans Jacq*.), an annual plant of the Asteraceae family, stands out, because it has flowers with diversified colors and petal shapes (Elhindi *et al*., 2016) and it can be cultivated throughout the year, in regions of mild or tropical temperature. Besides that, it can be grown in garden compositions and it is proposed to be commercialized as cut flower and potted plant, which makes it as a species with multiple possibilities of uses. Zinnia holds a prestigious position in the flower cut industry for its versatility, numerous colors and low maintenance in the field. Besides that, the longevity of its flowers, which can reach 21 days, is an important characteristic for the cut flower market (Martins *et al*., 2021).

Genetic makeup of the plant, environment, nutrition, soil moisture etc. are important factors affecting the growth and flower productivity of ornamental plants, in general and in Zinnia, specific of which nutritional effects play more important role for producing qualitative flowers in quantum, although soil and climate of a specific region influence the nutrition requirements which also depend on the variety used. It has been observed that cultivars exhibiting rapid vigorous growth and developing large sized plants having the large sized flowers respond more to fertilizers than those with low vigour, producing small flowers (Schrawat *et al*., 2003). Nitrogen is one of the very important major plant nutrients which directly affect the plant growth and flowering behavior. Application of appropriate amount of nitrogen is important as its deficiency causes several abnormalities like over growth and less flowering. Application of Nitrogen through spraying is much more beneficial and quick performing, because plant absorbed nutrients through stomata.

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Materials and Methods

The field experiment was carried out during rainy season in two consecutive years (2006 and 2007) in plot A-4 of research section of Horticulture Department at the R. B. S. College, Agricultural Farm, Bichpuri, Agra. The soil of experimental field was sandy loam in texture having 7.8 pH. The experimental field was prepared thoroughly and a uniform application of FYM at the rate of 20t/ha was applied at the time of soil preparation. The varied doses of nitrogen *i.e.* 50, 100 and 150 Kg/ha were applied through urea. Half amount of urea was applied as basal dressing while rest half amount was given as top dressing in one installment at 30 days after transplanting. The total quantity of P and K as per their levels were supplied through single super phosphate and muriate of potash, respectively which were applied as full dose of basal dressing. The seeds of Zinnia *Cv*. Persian Carpet was procured from M/S Fine Grow seeds. Sowing was done in outdoor beds on 5th June in both the years, seedling of 4 weeks in age were lifted from nursery and planted in prepared plots at the spacing of 40 cm × 30 cm apart in the evening hours on 30th June 2006 and 2nd July in 2007 followed by a light irrigation. Growth parameters such as height of plant, diameter of stem, number of leaves and length of the longest leaf were studied during the course of investigation.

Results and Discussion

According to the data arranged in Table 1 exhibited that all the doses of nitrogen were better over the control. The growth parameters studied such as height of plant, diameter of stem, number of leaves and length and width of the longest leaf at successive stages of observations were improved with each dose of nitrogen in each cropping season. N_2 treatment in Plant height was considered the best performer; it is 105.08 cm in comparison to 102.32 cm of control. The other treatments having the low dose and high dose were not found as good as the N_2 treatment because of the dose requirement by the plant (Karavida and Dhaduk, 2002). In the case of diameter of stem (cm) at 90 days treatment N_2 observed the best data as it was 1.76 cm in comparison to 1.68 cm of control. The data recorded on length of the longest leaf showed that at 90 days it was 27.32 cm as compared to 24.96 of control. The pronounced effect of nitrogen is to stimulate carbohydrate use within plant and thus to increase the plant growth resulting in increased photosynthetic surface which is well known fact. Appropriate dose of nitrogen increases the chlorophyll content in leaves increasing thereby the photosynthetic activities in plants (Sigedar *et al*., 1991).

An examination of the data presented in Table 2 revealed that a successive increase in level of N from N_0 to N_1, N_1 to N_2, and N_2 to N_3 significantly delayed the visibility of first floral bud. Thus, the maximum delay in the visibility of first floral bud was recorded with the highest rate of N (150Kg/ha). Like to that of visibility of first floral bud the days of colour break in the first floral bud under the application of Nitrogen was seen the similar trend (Beckmann *et al*., 2017). Each successive rise in the dose of Nitrogen considerably delayed the colour break stage in the first floral bud. In the case of days to start of flowering the similar data were observed, we found that as we increase the dose of nitrogen there is significantly delayed in the days to first plucking of floral heads with the increasing level of nitrogen (Iqbal *et al*., 2012). An examination of the data presented in Table 2

Table 1: Effect of different levels of Nitrogen on various growth parameters at 30, 60 and 90 DAP (Pooled data of two years)

Treatment	Plant height (cm)			No. of leaves			Diameter of Stem (cm)			No. of Primary Branches			Length of Longest leaf (cm)		
Level of N	30	60	90	30	60	90	30	60	90	30	60	90	30	60	90
N_0(Control)	49.22	73.88	102.32	23.87	60.50	90	0.56	1.12	1.68	2.65	4.29	5.26	10.15	18.82	24.96
N_1(50)	51.6	76.22	104.41	26.17	63.88	94	0.77	1.29	1.73	3.26	4.85	5.78	12.32	20.35	26.70
N_2(100)	52.19	76.85	105.08	27.79	64.70	95.05	0.81	1.33	1.76	3.35	4.99	5.90	12.94	20.78	27.32
N_3(150)	52.12	76.80	105.00	26.77	64.64	94.58	0.80	1.30	1.74	3.28	4.90	5.82	12.80	20.70	27.30
S.Em±	0.288	0.341	0.394	0.230	0.274	0.389	0.027	0.024	0.018	0.074	0.095	0.093	0.243	0.238	0.206
CD at 5%	0.846	1.001	1.147	0.676	0.804	1.142	0.080	0.071	0.055	0.217	0.281	0.275	0.714	0.710	0.606

Table 2: Effect of different levels of Nitrogen on various developmental parameters (Pooled data of two years)

Treatment	Days to visibility of First Floral Bud	Days to colour break in the first floral bud	Days to start of flowering	Days to first plucking of floral heads	Days to last plucking of floral head (Periodicity of cropping)
Level of N					
N_0 (Control)	25.25	28.60	32.58	37.10	54.10
N_1 (50)	30.45	34.85	38.90	41.84	60.72
N_2 (100)	35.88	40.33	44.28	45.52	68.44
N_3 (150)	41.98	45.18	49.20	53.20	70.90
S.Em±	0.0639	0.0542	0.527	0.0541	0.0417
CD at 5%	0.187	0.159	0.155	0.159	0.122

indicated that a successive rise in Nitrogen significantly lengthened the period of last plucking of floral heads at each stage.

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