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EFFECT OF NITROGEN AND POTASSIUM FERTILIZATION ON MORPHOLOGICAL TRAITS OF *ZINNIA ELEGANS* J.

K.K. Larikl, , M.A. Shafkh-[1], **A.A.** Kakar-[2] **& Munir** A~Shaikh3
IFaculty of Crop Production, SAU, Tandojam
ZAgronomist,A,D.I., Khanpur, Usta Muhammad
3Horticulturist, A,R.I., Sariab, Quetta

An experiment to assess the effect of different rates of nitrogen and potassium on morphological traits of Zinnia was conducted at the Sindh Agriculture University, Tandojam during the year 1997. The fertilizer treatments comprised 20-10, 20-15, 40-10, 40-15, 60-10 and 60-15 g NK/4m^2. The maximum plant height (74.50cm), branches per plant (16.05), leaves per branch (17.75), blooming period (55.00 days), flowers per plant (15.05) and flower weight (13.25g) were recorded with the application of 60 g N+15 g KZ05/4m^2.Mean squares attributable to treatments differed highly significantly for all the quantitative traits showing the importance of fertilizer treatments in influencing morphological characteristics of Zinnia plant.

Key words: morphological traits, nitrogen and potassium fertilization, *Zinnia elegans* J.

INTRODUCTION

Zinnia *(Zinnia elegans* J.) is the most important flower of all the half-hardy annuals belonging to the family compositae and is the mainstay of the tropical gardening. Balanced application of nutrients especially nitrogen and potassium plays a vital role in the development, production and quality of different flowers (Charles, 1962; Collins and Duke, 1981; Dahab *et al.,* 1987; Khan, 1994). Therefore, the effect of Nand K fertilization on the morphological characteristics of Zinnia was investigated in the present study.

MATERIALS AND METHODS

The present investigation was carried out at the Sindh Agriculture University, Tandojam during the year 1997. The experiment was laid out in a randomized complete block design with four replications. The plot was thoroughly prepared by working with spade, properly levelled and then divided into four equal blocks separated by 60 cm wide bunds. Each block subdivided into 6 plots measuring 2x2 m, separated with 50 cm bunds. Zinnia seedlings of uniform size were planted at a distance of 50 x 40 cm by accommodating 20 plants per plot. The fertilizer treatments comprised 20-10 (Tl), 20-15 (Tz),40-10 (T3),40-15 (T4),60-10 (Ts), and 60-15 (TB)g NK/4mz. Full dose of potash and half of N was applied at the time of seedbed preparation and remaining half dose of N was applied at the start of flowering. All the required cultural operations were adopted uniformly in all the plots throughout the growing period. Ten plants in each treatment were tagged to record observations on plant height, branches per plant, leaves per branch, blooming period, flowers per plant and flower weight. The data thus collected were analysed using Fisher's analysis of variance technique and mean values were compared by LSD test at 0.05 P (Gomez and Gomez, 1984).

RESULT AND DISCUSSION

The data pertaining to different morphological traits of Zinnia plant are presented in Table 1. The results of analysis have been shown in Table 2. Plants receiving the highest dose of N and K (T6:60 g N + 15g KZ05) on average produced significantly the maximum plant height (74.50 cm), branches per plant (16.05) and leaves per branch (17.75) followed by plants receiving 60 g N + 109 &05. The lowest plant height (53.00 cm), branches per plant (9.25) and leaves per branch (13.50) were recorded with 'I'i (20 g N +10g &05). These data further indicated that the mean values of these traits increased consistently as the Nand K levels were enhanced.

Consolidated analysis of variance (Table 2) showed highly significant variance ratio for plant height, branches per plant and leaves per branch, indicating the importance of nutrient elements in influencing these quantitative traits of Zinnia. Increasing rates of K in the presence of N increased the tissue growth and development, which steadily increased these traits at the expense of roots. These results are in agreement with the findings of Jhon *et al.* (1984), Shedeed *et al.* (1986), Dahab *et al. (1987)* and Shaikh (1997). The role of K in plants ineludes cation transport across membrane, water economy, energy metabolism and enezyme activity

Table 1. Morphological traits of *Zinnia elegans* J. as affected by combined application of nitrogen and potassium at different rates

Fertilizer treatments (g/4m2)			Plant height (cm)	Branches plant-1	Leaves per branch	Blooming period (days)	Flowers per plant	Flower weight (g)
	N	K						
Tl	20+	10	53.00f	9.25f	13.50c	77.50a	10.00f	8.62c
T2	20 +	15	56.75e	10.25e	13.75c	68.25b	10.50e	10.28c
T3	40+	10	65.50d	11,75d	15.25b	62.05b	12.25d	11,01b
T4	40+	15	69.25c	13.00c	15.75b	56.25d	14.00b	12.39b
T5	60+	10	11,75b	14.00b	17.00a	58.75e	13.25c	12.53c
T6	60+	15	74.50a	16.05a	17.75a	55.00f	15.05a	13.25a
S.E. =			0,48	0.18	0.22	1,18	0.32	0.12
Cdi =			1,67	1,04	1,17	2.61	1,36	0.86
Cdii =			2.09	1,30	1,42	3.25	1,70	1,08

Values followed by similar letters in a column are not significantly different at 0.05 P.

Table 2. Mean squares for different morphological traits as affected by combined application of nitrogen and potassium at different rates

Source of variance	df	Plant height	Branches per plant	Leaves per plant	Blooming period	Flowers per plant	Flower weight
Replications	3	77,47 **	14.26 **	0.66 NS	66,48 ••	19.61 ••	1.33 •
Treatments	5	2.92.87 **	30.94 **	11,66 ••	292.54 .*	17.66 ••	11.82 ••
Error	15	3.72	0.56	0.80	22.32	1,64	0.26

** Significant at 0.01 P; NS = Non-significant.

(Mengel and Kirby, 1980). Potassium increases carbon exchange and enhances carbohydrate movement (Collins and Duke, 1981) and consequently stimulates vegetative growth and decreases the translocation of photosynthats into storage organs.

Data on blooming period of Zinnia (Table 1) showed that early blooming (55.00 days) was obtained with combined application of 60 g N + 15 g K20S, while the plants receiving 20-10 g NKlplot took longer (77 days) to bloom.

ANOVA showed highly significant variance ratio indicating the importance of nutrients concentration in stimulating the blooming of Zinnia flower. These results are in agreement with the findings of Joiner (1967) who reported that the nutrient elements (N and K) enhanced tissue growth and flower development. The highest dose ofN and K (60 g N + 15 g K20S) produced significantly the maximum number of flowers (15.05) per plant and 13.25 g flower weight. In general, Nand K caused consistent increase in the number of flowers per plant and flower weight (Table 1). Application of K resulted in a positive yield response in terms of plucked flowers, while N stimulated vegetative growth which in turn increased floral development and consequently the number of flowers per plant and flower weight. Similar results were reported by Collins and Duke, 1981; Khan, 1994.

It is concluded that combined application of nitrogen and potash at higher rates (60-15 g/4m2) augmented plant growth and favourably influenced certain morphological traits of Zinnia.

REFERENCES

Charles, B. 1962. The Book of Gardening. Odhanns Press Ltd., London.

Collins, M. and S.H. Duke. 1981, Influence of potassium fertilizer rate on photosynthesis and N-fixation of alfalfa. Crop Sci. 21: 481-485.

Dahab, AM., ABadawy, E.M. Sarhan, AZ. Mansour. 1987. Effect of growing media, NPK fertilization rate on growth of *Aspidistra lurida.* Acta Hort. 205: 267-273.

Gomez, K.A and AA Gomez. 1984. Statistics for Agricultural Research. John Wiley and Sons, New York.

Jhon, A.Q., S.S. Saini and P.P. Sharma. 1984. Effect of nitrogen, potassium and plant spacing on growth and flowering of Pansy *(Viola tricolor* L). South Ind. Hort. 32(5): 292-296.

Joiner, J.N. 1967. Effect of P, K and Mg levels on growth, yield and chemical composition of

Chrysanthemum morifolium. Proc. Amer. Soc. Hort. Sci. 9: 389-396.

Khan, A.K. 1994. The Gardener.Elite Publishers Ltd., Lahore, Pakistan.

Mengel, K. and E.A. Kirby. 1980. Potassium in crop production. Adv. Agron. 33: 59-110.

Shaikh, M.A. 1997. Effect of various levels of nitrogen on vegetative growth and flower production of Gladiolus. M.Sc. Thesis, Sindh Agriculture University, Tandojam.

Shedeed, M.R., M.E. Hashim and A.A. Hagag. 1986. Effect of different fertilizer treatments on growth of *Ficus elastica.* Ann. Agri. Sci. Ain Shams Univ. 31(1): 717-725.