INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
1560–8530/2005/07–3–471–473
http://www.ijab.org

Effect of NPK Fertilizer on Performance of Zinnia (*Zinnia elegans*) Wirlyging Shade

QAZI ADEEL JAVID, NADEEM AKHTAR ABBASI, NADIA SALEEM, ISHFAQ AHMAD HAFIZ AND ASIA LATIF MUGHAL†
Departments of Horticulture and †Food Technology, University of Arid Agriculture, Rawalpindi, Pakistan

ABSTRACT

This study was carried out to find out the optimum combination of nitrogen, phosphorus and potassium for better production of Zinnia flowers in the soil and climatic conditions of Pakistan. Different fertilizer treatments were applied to *Zinnia elegans* cv. "Giant Dahlia Flowered Blue Point Series" Wiryging Shade. Among all the treatments, 30 + 20 + 20 NPK gm/m^2 performed best for plant height, number of lateral shoots, number of leaves, leaf area, number of flowers per plant and size of flower.

Key Words: Fertilizer; Zinnia; Wirlyging

INTRODUCTION

Zinnia elegans belongs to family Compositae. Zinnia are true American natives, which originated from Mexico and Central America. There are about 20 species in the Zinnia genus but *Z. elegans* is most popular among them. The height of Zinnia is approximately 30 inches (76 cm) with solitary daisy like flower heads and opposite, sandpapery, lance shaped leaves. The ray flowers are purple, the discs yellow and black; the entire head is about 2 inches (10 cm) in diameter and some with flower heads up to 6 inches (15 cm) across. Zinnias are double, semi-double and dahlia-like "pompon" flowers. Traditionally, taller varieties of Zinnia are used in borders, beds and for cut flowers but the dwarf varieties in containers and window planters. Zinnias are warm weather annuals. They do not tolerate frost. In Pakistan, it is a summer season crop and gives flowers from May to October. Good quality and regular supply of flowers can be achieved if proper combinations of fertilizer are applied to Zinnia crop. Nitrogen, Phosphorus and Potassium play a vital role in the production of good quality flowers. Scientific findings of various authors (Jana & Pal, 1991; Dhaka *et al*., 1999; Dar *et al*., 2002.) also showed the beneficial effect of various combination of fertilizer on numerous growth parameters of Zinnia. Present research project was envisaged to find out the optimum combination of nitrogen, phosphorus and potassium for better production of Zinnia flowers under soil and climatic conditions of Pakistan.

MATERIALS AND METHODS

This study was conducted at the Research Farm of the Department of Horticulture, University of Arid Agriculture, Rawalpindi, Pakistan to evaluate the effect of Nitrogen, Phosphorus and Potassium application in different proportions on the growth and flowering of Zinnia cv. "Giant Dahlia Flowered Blue Point Series" Wiryging Shade. Nursery of Zinnia (*Zinnia elegans*) Wirlyging variety was sown in 10 inches earthen pots. After sowing in pots light irrigation with sprinkler was done. Seedlings were transplanted after 3-4 week at 2-3 true leaf stages on well-prepared soil in field with row-to-row 60 cm and plant-to-plant 45 cm distance. The fertilizer treatments were as follow:

Treatment	$N + P_2O_5 + K_2O$ (g/m^2)
T_1	No Fertilizer Application
T_2	10 + 30 + 30
T_3	20 + 30 + 30
T_4	30 + 20 + 20
T_5	30 + 20 + 30

Whole phosphorus and potassium in the form of Single Super Phosphate and Potassium Sulphate, respectively and nitrogen in the form of Urea, was applied at the time of field preparation. All cultural practices were carried out according to the recommendations.

Data on plant height, number of lateral shoots, number of leaves, leaf area, and number of flower per plant and size of flower were recorded fortnightly according to Randomized Complete Design Block (RCBD) from field and subjected to analysis of variance technique and means were compared using least significant difference test (Steel & Torrie, 1980).

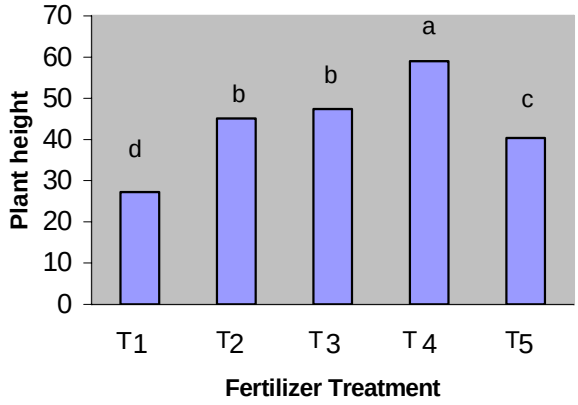
RESULTS AND DISCUSSION

T_4 (30:20:20 g NPK/m^2) performed best for Wirlyging Shade, in which maximum plant height, number of lateral shoots, number of leaves, leaf area, number of flower per plant and size of flower was recorded (Fig. 1 to 6). The performance with regard to all the parameters included in this study was poor in the experiments serving as control, i.e. T_1. These results are in line with the findings of Butters

(1970), Preeti *et al.* (1999), Bijimol and Singh (2001), Broschat and Moore (2001), Hend (2002), Kumar *et al.* (2002), and Dar *et al.* (2002). The ratio of fertilizers used in T_4 well suited for optimum growth of *Zinnia elegans.*

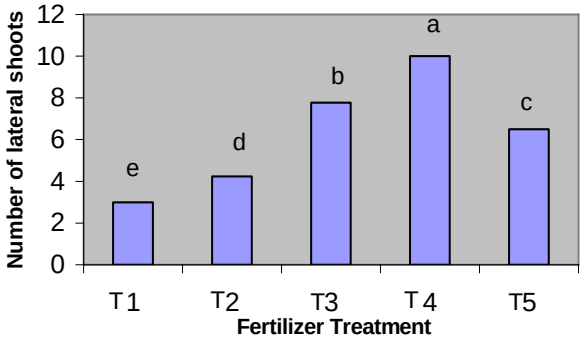
Although, all the fertilizers used have their importance, Nitrogen is considered to be the most crucial because it is a constituent of protein and nucleic acid, which is helpful in plant growth (Haque, 2001) and also promotes rapid growth. This is because of higher concentration of nitrogen, which has tendency to increase leaf cell number and cell size with an over all increase in leaf production as reported by Meyer *et al.* (1973). Potassium enhances the synthesis and translocation of carbohydrate; whereas, phosphorus encourages cell walls and length of plant

Fig. 1. Effect of NPK fertilizer on plant height (cm)



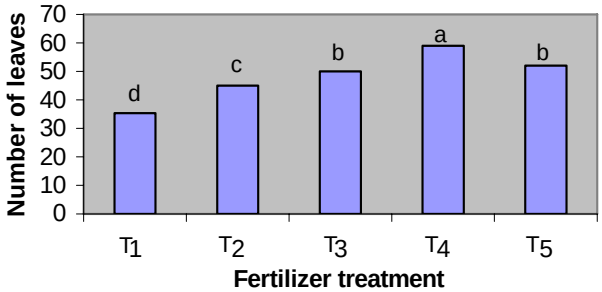
(Means not sharing similar letters differ significantly at $P \leq 0.05$)
(LSD Value = 6.427)

Fig. 2. Effect of NPK fertilizer on number of lateral shoots per plant



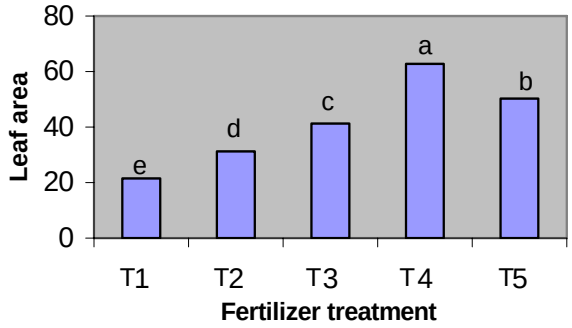
(Means not sharing similar letters differ significantly at $P \leq 0.05$)
(LSD Value = 1.158)

Fig. 3. Effect of NPK on number of leaves per plant



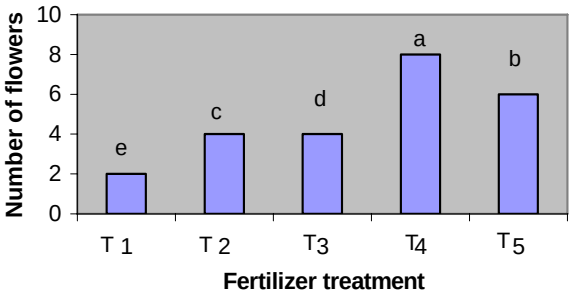
(Means not sharing similar letters differ significantly at $P \leq 0.05$)
(LSD Value = 6.326)

Fig. 4. Effect of NPK fertilizer on leaf area (cm^2)



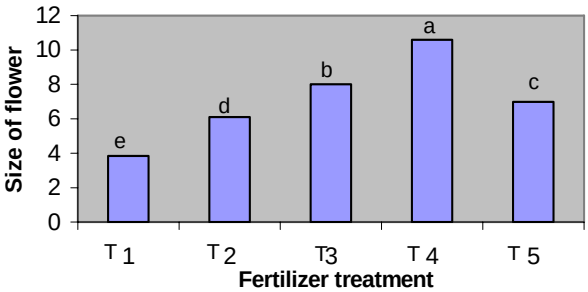
(Means not sharing similar letters differ significantly at $P \leq 0.05$
(LSD Value = 2.028)

Fig. 5. Effect of NPK fertilizer on number of flowers



(Means not sharing similar letters differ significantly at $P \leq 0.05$)
(LSD Value = 1.463)

Fig. 6. Effect of NPK fertilizer on flower size (cm)



(Means not sharing similar letters differ significantly at $P \leq 0.05$)
(LSD Value = 1.580)

(Henry, 1982). Potassium has also been reported to be involved in synthesis of peptide bond, and protein and carbohydrate metabolism, and also participates in rapid cell division and differentiation (Belorkar *et al*., 1992). Phosphorus and potash contents resulted in maximum increase in nutrient uptake by virtue of more photosynthesis resulting in more chlorophyll formation with an increased leaf area (Belorker *et al*., 1992). As high rates of fertilizers resulted in more branches, high rate of fertilizer also induced more number of bloom per plant (Samoilkenkoi, 1983). The highest level of nitrogen has pronounced effect on number of flowers (Khan *et al*., 1999). Balanced dose of nitrogen, phosphorus and potassium seemed to have increased the vegetative growth, favorable for the synthesis of peptide bond, protein and carbohydrate metabolism that are essential for flower development (Boodly & Meyer, 1965).

High nitrogen with appropriate dose of phosphorus and potassium seemed to have increased vegetative growth as earlier also reported by Denisen (1982). Hence, the balanced application of these nutrients resulted in higher number of leaves; however concentration of these nutrients beyond optimum has shown harmful effect on growth and development of plants.

REFERENCES

Belorkar, P.V., B.N. Patel., V.J. Golliwar and A.J. Kothare, 1992. Effect of nitrogen and spacing on growth, flowering and yield of African marigold. *J. Soils and Crops*, 2: 62–4

Bijimol, G. and A.K. Singh, 2001. Effect of spacing and nitrogen on gladiolus under Nagaland condition. *J. Orn. Hort*., 64: 36–9

Boodly, J.W. and J.R. Meyer, 1965. The nutrient content of Bonnaffom deltue chrysanthemum from juvenile to mature growth. *American Soc. Hort. Sci.*, 87: 472–8

Broschat, T.K. and K.A. Moore, 2001. Influence of substrate and fertilizer analysis and rate on growth and quality of five species of bedding plants. *Hort. Tech.*, 11: 156–61

Butters, R.E., 1970. An experimental programe on one year round chrysanthemum. *Genm. Gr*. (3879): 589–98 (Hort. Abst., 1971. 41(1): 210).

Dar, Q.A.H., T.K. Chattopadhyay., R.L. Misra and M. Sanyat, 2002. Studies on Growth Characters of Zinnia. Indian Soc. *Orn. Hort. New Delhi*, India. pp. 203–5 (CAB Absts. 2002/08–2003/04)

Denisen, E.L., 1982. *Principal of Horticulture*, pp. 409–12. Macmillan Publishers, Co., New York

Dhaka, R.S., M.S. Fageria, S. Mohemmed, A.S. Faroda, N.L. Joshi, S. Kathju and K. Amal, 1999. Effect of different levels of N, P and K on floral characters of zinnia. SKN College of Agric. Jaipur, India. pp. 379–82. (CAB Absts., 1998/08–2000/07)

Haque, I. and A.A. Jakhro, 2001. Soil and fertilizer potassium. In "*Soil Science*" National Book Foundation, Islamabad, Pakistan. pp. 261–3

Hend, E.W., 2002. Response of *Zinnia elegans* to phosphorus and potassium fertilizers (CAB Abstracts 2002/08–2003/04)

Henry, D., 1982. Effect of potassium on plant growth. *J. Orn. Hort. Sci*., 6: 320–1

Jana, B.K. and A. Pal, 1991. Response of nitrogen and phosphorus on growth flowering and yield of Cosmos. *Indian Agriculturist*, 35: 113–8

Khan, M.A., A.B. Malik, M.N. Khan and T. Saeed, 1999. Nitrogen fertilizer in *Zinnia elegans* in pot culture. *Pakistan J. Sci. Res*., 3: 81–4

Kumar, M., T.K. Chattopadhyay and M. Mukesh, 2002. Effect of NPK on yield and quality of gladiolus (*Gladiolus grandiflorus* L.) cv. Tropic Sea. *Env. Eco*., 19: 868–71

Meyer, B.S., D. Banderson, R.H. Bohning and D.G. Fratianne, 1973. *Introduction to Plant Physiology*, pp. 193–322. D. Van Nostrand Companey, New York

Preeti, H., R.L. Misra and P. Hatibarua, 1999. Effect of Nitrogen sources on vegetative and floral characters of gladiolus cv. Danvatri. *J. Orn. Hort*., 2: 111–4

Samoilkenkoi, N.I., 1983. Effect of nitrogen, phosphrous and potassium on growth and development of large flowered chrysanthemum. *Horticulturea American*, 23: 67–9

Steel, R.G.D. and J.H. Torries, 1980. *Principles and Procedures of Statistics*: *A Biometrical Approach*, pp. 232–51. McGraw Hill Book Co. Inc., New York

(Received 22 December 2004; Accepted 10 March 2005)