

Response of three Wheat (*Triticum aestivum* L.) Cultivars to Varying Applications of N and P

GHULAM ABBAS, AAMER IRSHAD† AND MUSHTAQ ALI‡

Water Management, Punjab, †Department of Agronomy, University of Agriculture, Faisalabad-38040, Pakistan,

‡Adaptive Research Farm, Vehari, Pakistan

ABSTRACT

Response of three wheat cultivars, Inqlab-91, Pasban-90 and Punjab-85 to varying applications levels of N and P viz., control, 75 kg N + 50 kg P₂O₅ and 150 kg N + 100 kg P₂O₅ ha⁻¹ was studied. Application of 150 kg N + 100 kg P₂O₅ ha⁻¹ to Inqlab-91 and 150-100 kg NP ha⁻¹ to Punjab-85 gave highest but similar yield as compared with all other NP levels and varieties.

Key Words: Wheat; Cultivars; Nitrogen; Phosphorus; Fertilization

INTRODUCTION

The use of varieties with better genetic potential and wide range of adaptability is of prime importance for increasing wheat production. Improved varieties, if sufficiently provided with essential nutrients, may result in further increase in yield. Nitrogen is one of the major plant food nutrient applied in the form of chemical fertilizers; whereas, phosphorus counter balances the effect of excessive nitrogen by hastening plant maturity and retarding excessive vegetative growth. Most of our soils are deficient in these nutrients (Tahir, 1980).

Significant differences in number of fertile tillers, plant height, 1000-grain weight, grain and straw yields of both the varieties at different levels of NP fertilizers have been reported (Hayee & Prasad, 1980).

This paper describes growth and yield response of three wheat cultivars to varying applications of N and P under the soil and climatic conditions of Vehari.

MATERIALS AND METHODS

Investigations to determine the response of three wheat cultivars to varying applications of N and P were carried out at the Adaptive Research Farm, Vehari on a sandy clay loam soil having pH 8.31 with total nitrogen 0.043%, available phosphorus 4.68 ppm and available potash 172 ppm.

Experiment was laid out in a RCBD (factorial) with three replications and a net plot size measuring 5 m x 1 m. The fertilizer treatments comprised control, 75 kg N + 50 kg P₂O₅ and 150 kg N + 100 kg P₂O₅ ha⁻¹ and the varieties included in the test were Inqlab-91, Pasban-90 and Punjab-85. Sowing was done in the 3rd week of November on a well prepared seed bed in 25 cm apart

rows with the help of a single row hand drill. A seed rate of 100 kg ha⁻¹ was used. Urea and single superphosphate were used as sources of nitrogen and phosphorus, respectively. The whole quantity of phosphorus and half of nitrogen was applied at the time of sowing, while remaining nitrogen was applied with first irrigation. All other practices such as irrigation, weeding etc. were kept normal and uniform for all the treatments. Crop was harvested in the first week of May.

The data on final plant height, tillers per unit area, number of grains per spike, 1000-grain weight, grain yield and straw yield were collected at maturity stage. Data was statistically analysed according to method described by Steel and Torrie (1984).

RESULTS AND DISCUSSION

The analysis of variance showed significant differences among the varieties and varying application of fertilizers for almost all the traits studied.

Plant height. Statistical analysis of data (Table I) showed that application of NP fertilizers in all the varieties increased plant height over control. A gradual increase in NP application increase plant height in all the varieties. Inqlab-91 grown with 150 + 100 kg NP ha⁻¹ produced maximum plant height (106.77 cm). The response of Pasban-90 and Punjab-85 to higher levels of NP was less for plant height. Differences in plant height amongst varieties maybe attributed to their variation in genetic potential. The results get support from the findings of earlier workers (Bakhsh & Mian, 1973; Hayee & Prasad, 1980; Singh & Seth, 1980).

Number of tillers per unit area. Data (Table I) depicted that total number of tillers produced per unit area by Punjab-85 were significantly the highest amongst the varieties used in this study. Application of 75-50 or 150-

100 kg NP ha⁻¹ to Punjab-85 produced the maximum number of tillers per unit area. Number of tillers per unit area was not increased substantially in Inqlab-91 and Pasban-90. Variation in the number of tillers per unit area by different varieties of wheat at different levels of N and P were also reported by Ashraf *et al.* (1992), and Hayee and Prasad (1980).

has also been reported by Singh and Sharma (1972), Tahir (1980), Bhatti *et al.* (1985) and Ashraf *et al.* (1992).

Straw yield. Application of NP in all the varieties increased straw yield over control (Table I). Maximum straw yield (7.63 t ha⁻¹) was produced by Inqlab-91 grown with 150-100 kg NP ha⁻¹. The next to follow in

Table I. Response of three wheat cultivars to varying applications of N and P.

Treatments		Plant height (cm)	Tillers/unit area	Grain/spike	1000-grain weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)
Variety	Fertilizer N-P ₂ O ₅ (kg ha ⁻¹)						
Inqlab-91	00-00	82.96 e	256.00 g	36.83 bc	32.10 bc	3.37 bc	4.93 e
"	75-50	99.72 b	276.67 f	41.17 a	37.27 a	4.58 a	6.67 bc
"	150-100	106.77 a	282.33 def	42.80 a	39.10 a	4.80 a	7.63 a
Pasban-90	00-00	73.44 f	280.33 ef	30.77 d	29.37 d	3.29 d	4.31 f
"	75-50	86.10 d	297.67 cde	36.20 c	34.20 c	4.47 c	5.92 d
"	150-100	92.09 c	310.00 bc	38.43 b	35.27 b	4.67 b	6.24 cd
Punjab-85	00-00	73.05 f	299.67 cd	32.73 d	30.63 d	3.27 d	4.47 f
"	75-50	87.88 b	321.00 ab	38.60 b	35.33 b	4.42 b	4.48 bc
"	150-100	92.42 c	331.67 a	41.07 a	36.50 a	4.62 a	6.86 b
LSD		2.70	18.12	2.02	0.83	0.25	0.44

Means not sharing a letter differ significantly at 5% level

Number of grains per spike. Application of 75-50 kg NP ha⁻¹ to Inqlab-91 and 150-100 kg NP ha⁻¹ to Inqlab-91 and Punjab-85 produced the maximum and statistically similar number of grains per spike. Application of less NP (75-50 kg ha⁻¹) to Punjab-85 resulted similar number of grains per spike as were produced by Pasban-90 at higher NP level (150-100 kg ha⁻¹). Data suggested that the number of grains per spike were controlled both genetically and through nutrition in these varieties. Similar results have been reported by Hayee & Prasad (1980).

1000-grain weight. Inqlab-91 grown without NP fertilizer produced as heavier grains as were produced by application of 75-50 kg NP ha⁻¹ to Pasban-90 and Punjab-85 and 150-100 kg NP ha⁻¹ to Pasban-90. Application of 75-50 kg NP ha⁻¹ to Inqlab-91 and 150-100 kg NP ha⁻¹ to Inqlab-91 and Punjab-85 resulted in highest and statistically similar 1000-grain weight. Similar results depicting differential behaviour of different varieties to different NP levels have also been reported by Bakhsh and Mian (1973), and Singh and Seth (1980).

Grain yield. Maximum but statistically similar grain yields of 4.58, 4.80 and 4.62 t ha⁻¹ were recorded for Inqlab-91 grown with 75-50 and 150-100 kg NP ha⁻¹ and Punjab-85 with 150-100 kg NP ha⁻¹, respectively. Inqlab-91 grown without NP gave as good yield as Pasban-90 grown with NP application @ 75-50 & 150-100 kg ha⁻¹ and Punjab-85 with 75-50 kg NP ha⁻¹. Similar results in grain yield of different varieties with different NP levels

this regard was Punjab-85. Pasban-90 produced less straw yield as compared with the other varieties. The results are in conformity with those of Bhatti *et al.* (1985) and Ashraf *et al.* (1992).

REFERENCES

- Ashraf, M., A.M. Ranjha and S.M. Mehdi, 1992. Fertilizer requirements of wheat grown under rainfed conditions of Faisalabad. *Proc. 3rd. Natl. Congr. Soil Sci.*, Lahore, p. 470.
- Bakhsh, M.R. and M.A. Mian, 1973. Effect of fertilizer on composition of promising wheat varieties evolved at University of Agriculture, Lyallpur. *Pakistan J. Agri. Sci.*, 10: 135-42.
- Bhatti, A.U., A. Bakhsh and A.N. Gurmani, 1985. Effect of nitrogen and phosphorus on the yield of wheat. *Pakistan J. Agri. Sci.*, 1: 25-30.
- Hayee, M.R. and R. Prasad, 1980. Effect of nitrogen and row direction on yield and yield components in pure and systematic mixed stand of wheat varieties differing in plant height. *Indian J. Agri.*, 25: 332-41.
- Singh, D.P. and H.C. Sharma, 1972. The effect of different doses of nitrogen, phosphorus and potash on growth, yield and quality of wheat. *Beitrag Zurtoischen*, 10: 315-25 (*Field Crop Absts.*, 27: 1074; 1974).
- Singh, R.P. and J. Seth, 1980. Nitrogen and phosphorus management of wheat under the condition of delayed availability of fertilizer. *Indian J. Agri.*, 25: 430-40.
- Steel, R.G.D. and J.H. Torrie, 1984. Principles and Procedure of Statistics. McGraw Hill Book Co., Inc. Singapore, pp: 172-8.
- Tahir, M., 1980. Wheat Production Manual. Pak. Agri. Res. Council, Islamabad, p: 77-80.

(Received 05 May 2000; Accepted 01 June 2000)