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Response of wheat (*Triticum aestivum*) genotypes to nitrogen and phosphorus

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Wheat (*Triticum aestivum* L. emend. Fiori & Paol.) crop cultivated under *karewa* conditions of Kashmir receives better moisture condition as winter crop through rain and snow. However, productivity is low due to inadequate use of fertilizers and lack of improved varieties for existing agro-climatic conditions. Therefore an experiment was conducted to evaluate the response of wheat cultivars to nitrogen and phosphorus application.

The field experiment was carried out during the winter season of 1987–88, 1988–89 and 1989–90 at Srinagar. The soil was silty clay loam having pH 7.6, organic carbon 0.64%, electrical conductivity 0.07 dS/cm, available N 280 kg/ha, P 11.5 kg/ha and K 238 kg/ha. The treatments were laid out in split-plot design with 2 cultivars ('VL 421' and 'HS 86') and 5 nitrogen levels (0, 40, 80, 120 and 160 kg/ha) in main plots and 4 P_2O_5 levels (0, 20, 40 and 60 kg/ha) in subplots with 3 replications.

The seed was sown 23 cm apart @ 100 kg/ha in the last week of October and the crop was harvested during the last week of June during all the 3 seasons. A uniform dose of 20 kg K_2O/ha as muriate of potash along with entire quantity of P_2O_5 as single superphosphate and half of nitrogen in the form of urea as per treatments were applied at the time of seeding. The remaining N was top-dressed in the last week of March. The annual rainfall recorded during the cropping seasons was 525.5, 483.7 and 404 mm in 1987–88, 1988–89 and 1989–90 respectively.

'VL 421' significantly outyielded 'HS 86' wheat during 1987–88 and 1989–89 on the basis of 1,000-grain weight and number of grains/ear (Table 1). However, both the cultivars were at par during 1988–89. Grain yield increased significantly up to 120 kg N/ha during 1987–88, whereas significant increase in grain yield was obtained only up to 80 kg N/ha in the other 2 years (Table 1). The differences in variable response over the years may be attributed to early germination and proper establishment of crop stands during 1987–88 due to receipt of sufficient rainfall in October. However, as evidenced by pooled data, grain yield increased significantly up to 12 kg N/ha, the magnitude of increase being 162.9% over the control (Table 2). The increase in yield may be attributed to increase in spikes/m^2, grains/ear and 1,000-grain weight (Table 1). The results confirm the findings of Singh *et al.* (1992).

Phosphorus application increased the grain yield significantly up to 40 kg P_2O_5/ha during all the years (Table 1) and magnitude

Table 1. Effect of variety, nitrogen and phosphorus on yield and yield attributes of wheat

Treatment	Effective tillers/m^2			Grains/ear			1,000-grain weight (g)			Grain yield (q/ha)		
	1987–88	1988–89	1989–90	1987–88	1988–89	1989–90	1987–88	1988–89	1989–90	1987–88	1988–89	1989–90
Variety												
'VL 421'	295.8	255.7	247.3	35.0	30.6	31.4	43.9	43.6	43.1	45.92	32.86	34.42
'HS 86'	299.0	251.5	249.5	33.1	30.9	30.9	42.1	42.9	42.1	44.66	32.82	31.69
CD (P = 0.05)	NS	NS	NS	0.6	NS	NS	0.05	0.32	0.5	1.20	NS	2.26
N (kg/ha)												
0	253.3	221.4	221.1	23.4	20.0	18.6	36.8	36.7	36.8	22.25	14.86	15.85
40	274.9	243.3	239.4	32.8	29.7	29.0	41.9	41.0	42.0	38.59	29.01	27.36
80	310.6	259.6	254.0	36.6	32.8	34.7	43.6	44.5	43.4	51.62	38.21	39.30
120	322.5	270.1	261.2	38.5	35.1	36.2	45.7	46.4	45.6	57.05	40.82	41.16
160	325.7	273.7	266.3	39.0	36.2	37.1	47.1	47.7	47.0	56.94	41.31	42.02
CD (P = 0.05)	6.5	8.5	7.2	1.3	0.6	1.0	0.51	0.50	0.44	2.28	2.71	3.57
P_2O_5 (kg/ha)												
0	289.8	232.1	237.5	32.9	29.7	30.2	42.3	42.3	41.9	42.40	30.05	29.88
20	294.3	247.2	245.5	33.9	30.6	30.9	42.7	43.1	42.4	44.43	32.72	32.82
40	300.2	263.5	252.2	34.3	31.2	31.5	43.3	43.6	42.9	46.84	33.60	34.49
60	305.4	271.5	258.3	35.1	31.4	31.9	43.7	43.9	43.3	47.49	35.01	35 01
CD (P = 0.05)	5.8	6.1	5.4	NS	0.6	NS	0.61	0.33	0.44	1.36	1.09	1.06

Table 2. Interaction effects between varieties and nitrogen on grain yield (q/ha) of wheat (pooled data of 3 years)

Variety	Nitrogen (kg/ha)					
	0	40	80	120	160	Mean
'VL 421'	17.51	30.81	43.79	48.12	48.32	37.71
'HS 86'	17.73	32.14	42.26	44.52	45.12	36.41
Mean	17.62	31.62	43.02	46.32	46.72	
			Variety	*N*	*N x variety*	
CD (P = 0.05)			0.66	1.05	1.46	

of increase in mean grain yield with 40 kg P_2O_5/ha over the control was 12.3% (Table 2). Increase in grain yield may be associated with the favourable effects of P application on yield attributes, viz. effective tillers/m^2, grains/ear and 1,000-grain weight (Table 1). Singh *et al.* (1987) also recorded the response of grain and straw yields up to 40 kg P_2O_5/ha.

In the pooled data of grain yield, a quadratic model was fitted for N and P to wheat. The regression equations worked out as:

$$Y = 17.436 + 0.4344\ N - 0.0016\ N^2\ (R^2 = 0.98)$$

$$Y = 43.09 + 0.1453\ P - 0.001\ P^2\ (R^2 = 0.91)$$

The economic optimum dose was found to be 83.9 kg N/ha at a grain yield of 42.6 q/ha and 43.1 kg P_2O_5/ha at a grain yield of 38.5 q/ha.

A significant interaction between N levels and varieties was observed from pooled data (Table 2). Both the varieties gave comparable grain yields up to 80 kg N/ha and at higher N levels 'VL 421' gave significantly higher yield than 'HS 86'.

Under *karewa* conditions of Kashmir valley, farmers can increase the wheat yields economically with the application of N and P_2O_5 @ 84 and 43 kg/ha respectively.

REFERENCES

Singh, T., Singh, K. N. and Bali, A. S. 1992. Response of wheat (*Triticum aestivum*) varieties to nitrogen under rainfed conditions of Kashmir. *Indian Journal of Agronomy* **37** (1) : 49–51.

Singh, A. K. 1991. Response of irrigated wheat (*Triticum aestivum*) to nitrogen and phosphorus on farmer's field in Ganga diara of Bihar. *Indian Journal of Agronomy* **36** (suppl.) 46–52.

Singh, Mahataim, Gupta, G. R. and Singh, M. P. 1987. Response of wheat to nitrogen, phosphorus and potassium. *Indian Journal of Agronomy* **32** (1) : 52–55.