Pak. J. Agri. Sci.
27 (2) 183, 1990

RESPONSE OF TWO WHEAT CULTIVARS TO DIFFERENT LEVELS OF PHOSPHORUS

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To see the effect on growth and yield performance of two wheat cultivars (Pak–81 & SS–5) treated with varying phosphorus doses (0, 50, 75 and 100 kg–ha^{-1}) with and without N and K (100 kg ha^{-1} each) an experiment was conducted on a sandy clay loam soil havlng .03% N, 5.3 and 144 ppm P_2O_5 and K_2O, respectively. The results revealed that grain yield of S S–5 (53.1 q ha^{-1} was significantly higher than that of Pak–81 (44.0 q ha^{-1}). The application of complete fertilizer (100–100–100 kg ha^{-1} of N, P and K) increased the grain yield upto 55.4 q ha^{-1} but it did not differ significantly from the treatments where N and P were applied either in 100–100 or 100–75 kg ha^{-1} combinations. The increase in yield was attributed to increase in the yield components namely, number of fertile tillers per plant, number of grains per spike and weight of 1000–grains.

INTRODUCTION

Chemical fertilizers constitute the most important current technology that contributes more than any other input to the productivity of crops. Improved cultivars is another important contributing factor which geared revolution in crop production in the world. Doubtlessly it can be said that further progress in achieving high yields of crops especially in wheat will depend dominantly, on high yielding varieties and judicious use of fertilizers. Among fertilizers, combined application of N, P and K has been proved to be more decisive in increasing yield of wheat as compared to sole application of either N, P and K. (Popov, 1971, Malik and Mian 1973, Mahmmud 1974, Samad 1984 and Ashraf 1987).

Similarly certain researchers have identified the superiority of some cultivars over the others under the same set of environments, Ahmad, 1979 ; Dogar, 1983 and Ashraf, 1987).

The present study was, carried out to determine the balanced and economical level of N, P and K for exploiting maximum potential of two wheat cultivars viz., Pak–81 and S S–5.

MATERIALS AND METHODS

The investigation was carried out on a sandy clay loam soil having pH 8.35 with total nitrogen 0.03%, available phosphorus 5.3 ppm and potash 144 ppm as determined by analysing the soil samples drawn before seeding. The quadrupticated experiment was laid out in a split plot design with net plot size measuring 5.0 X 2.5 meters. The main plots were assigned to wheat cultivars; Pak–81 and SS–5. The various NPK levels i.e. 0–0–0, 100–0–0, 100–50–0, 100–75–0, 100–100–0, 100–100–100 kg ha^{-1} were assigned to sub–plots, using urea, single superphosphate and sulphate of potash as sources of N,P and K, respectively. Full does of P_2O_5 and K_2O alongwith half of nitrogen was side drilled immediately after seeding and remaining nitrogen was applied with the first irrigation.

The crop was sown on November 18, 1987 with the help of a hand drill, using a seed rate of 100 kg ha^{-1}, in 25 cm apart rows. Observations on various growth and yield parameters were recorded during the course of these studies. The data collected were

Table 1. Effect of NPK application on yield and yield components of two wheat cultivars

	Treatments	Fertile tillers (m^{-2})	1000–grain wt. (g)	Grain Yield q ha^{-1}	Straw Yield	Harvest Index %
A)	N P K (Kg ha^{-1})					
	0–0–0	236 d	34.2 c	32.7 d	44.2 d	42.4 d
	100–0–0	278 c	34.7 c	44.7 c	53.7 c	45.3 c
	100–50–0	283 b	36.1 bc	49.2 b	56.4 b	46.5 b
	100–75–0	288 a	37.1 ab	54.5 a	59.0 a	47.9 a
	100–100–0	288 a	38.6 a	54.7 a	58.9 a	48.1 a
	100–100–100	290 a	38.7 a	55.4 a	59.7 a	48.0 a
B)	*Varieties*					
	Pak – 81	270 b	34.9 b	44.0 b	56.9 a	43.3 b
	S S–5	284 a	38.2 a	53.1 a	53.7 b	49.4 a

Table 2. Economic Analysis

Cvs.	Treatments of cultivars (N, P and K kg ha^{-1})			Wheat yield (q ha^{-1})		Gross income Rs.	Cost of cultivation	Net income	B. C. R.
	N	P	K	Grain	Bhoosa/ Straw				
F_1 Pak–81	0	0	0	29.20	45.25	7343.50	3636.41	3707.09	2.01
F_2 Pak–81	100	0	0	40.10	55.86	9896.36	4201.41	5694.95	2.35
F_3 Pak–81	100	50	0	44.43	58.63	10867.05	4416.41	6450.64	2.46
F_4 Pak–81	100	75	0	49.85	60.71	12040.55	4523.91	7516.64	2.66
F_5 Pak–81	100	100	0	50.17	59.92	12082.45	4631.41	7451.04	2.60
F_6 Pak–81	100	100	100	50.86	61.11	12259.60	4871.41	7388.19	2.51
F_1 SS–5	0	0	0	36.12	43.10	8697.60	3776.57	4921.03	2.30
F_2 SS–5	100	0	0	49.45	51.63	11686.15	4341.57	7344.58	2.69
F_3 SS–5	100	50	0	54.10	54.30	12719.50	4556.57	8162.93	2.79
F_4 SS–5	100	75	0	59.23	57.36	13862.95	4664.07	9198.88	2.97
F_5 SS–5	100	100	0	59.30	57.67	13886.60	4771.57	9115.03	2.91
F_6 SS–5	100	100	100	60.21	58.39	14094.75	5011.57	9083.18	2.81

Including cost of variable factor benefit cost ratio (B. C. R.)

Cost of commodities

(i) Wheat grain = Rs. 205/– per quintal
(ii) Wheat bhoosa = Rs. 30/– per quintal
(iii) Nitrogen from urea Rs. 5.65 kg^{-1}
(iv) Phosphorus fromS. S. P. (Powder) Rs. 4.30 kg^{-1}
(v) Potash from potassium sulphate Rs. 2.40 kg^{-1}

analysed by using analysis of variance technique and DMR test at 5% level was employed to compare the treatments' means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The data regarding various yield contributing parameters (Table 1) revealed that, in general, all the fertilizer treatments tended to affect these parameters and remained significantly superior to the control. Whereas most oftenly the higher levels of NPK i.e. 100–75, 100–100 or 100–100–100 kg ha^{-1} significantly differed in performance from other fertilizer treatments. However, these three treatments did not differ significantly from one another in terms of their effect on yield components and yield. From these results and the economic analysis given in Table 2 it can safely be concluded that a combination of N and P (100–75 kg ha^{-1}) was the optimum one for exploiting maximum potential of the varieties under the given set of conditions. These results can be attributed to a balanced level of nutrition favouring better plant growth and development, ultimately leading to higher production. These results confirm the findings of earlier researchers (Popov1971, Malik and Mian 1973, Mahmud 1974, Anwar 1981, Samad 1984 and Ashraf 1987) who maintained that combined application of N and P had a decisive role in increasing yield of wheat as compared to sole application of N or P. Amongst the varieties, SS–5, being semidwarf, showed better performance than Pak–81. SS–5 exhibited better tillering, grain filling and heavier grains resulting in higher grain yield per hectare. This variety seemed to be more economical/profitable giving a higher level of net income as evident from Table 2. Similar varietal differences were also reported by Dogar (1983).

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