

Response of *desi* cotton (*Gossypium arboreum*) to nitrogen, phosphorus and potassium fertilization in western Uttar Pradesh

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Three different trials with nitrogen, phosphorus and potassium were conducted on 'Lohit' *desi* cotton (*Gossypium arboreum* L.) during the rainy (*kharif*) season of 1987, 1988 and 1989 at Bulandshahr. The soil was sandy loam in texture with pH 7.5, organic carbon 0.57%, cation-exchange capacity 9.6 meq/100 g, available P 12.4 kg/ha and K 208 kg/ha. The treatments comprising combinations of 6 levels of N and 5 levels each of P and K (Table 1) were tried in randomized block design with 5 replications for nitrogen and 6 replications for P and K trials. The P and K were applied as basal dose and N in 2 splits (half as basal and rest half top-dressed at flowering). The crop was sown during the second fortnight of May in each year. The pooled data of 3 years were analysed statistically.

The variation in seed-cotton yield due to different levels of N was significant and the maximum seed-cotton yield was obtained with 60 kg N/ha (Table 1). There was an increase owing to 60 kg N/ha in seed-cotton yield by 65.6, 34.6, 4.6, 27 and 77.9% over 0, 30, 90, 120 and 150 kg/ha respectively. The results confirm the findings of Bharadwaj *et al.* (1988). The significant increase in yield-contributing characters, viz. number of bolls and boll weight, with 60 kg N/ha application resulted in yield up to

1,521 kg/ha. However, increase in flower initiation and plant height decreased the seed-cotton yield considerably. These results are partly in accordance with the findings reported by Brar *et al.* (1992).

Application of 60 kg P/ha gave the highest seed-cotton yield, which differed significantly from 0, 20 and 80 kg P/ha. However, it did not show any significant difference from 40 kg P/ha for seed-cotton yield. On an average, the increase in seed-cotton yield with 40 and 60 kg P/ha over 0, 20 and 80 kg P/ha was 16.64 and 18.46, 14.46 and 16.19 and 17.63 and 19.46% respectively. Application of P up to 30 kg/ha increased the seed-cotton yield significantly over the control. Sharma *et al.* (1988) also reported increased seed-cotton yield with P. The significant increase in yield of seed-cotton due to P is attributed to flower initiation, number of bolls and boll weight. No significant response was observed with the application of potassium.

The N and P curvilinear regression of orthogonal polynomial was significant. The functional relationships between seed-cotton yield and N and P were best fitted by the equations (Table 2).

The yield response was 1,438.32 kg/ha at the economic optimum rate of 74.44 kg/ha for N and 1,634.84 kg/ha at the optimum

Table 1. Effect of N, P and K on seed-cotton yield and yield attributes in *desi* cotton (pooled data of 3 years)

Fertility level (kg/ha)	Days to flower initiation	Bolls/plant	Plant height (cm)	Boll weight (g)	Ginning (%)	Seed-cotton yield (kg/ha)
<i>Nitrogen</i>						
0	78	10.4	98.6	1.92	37.4	918
30	76	12.8	115.8	2.02	37.8	1,130
60	74	17.2	118.6	2.06	38.4	1,521
90	80	14.4	117.2	2.05	39.0	1,454
120	90	12.6	120.8	2.08	38.5	1,198
150	111	8.6	132.7	2.00	38.8	855
CD (P = 0.05)	6.60	4.20	16.87	0.08	NS	177.63
<i>Phosphorus</i>						
0	88	15.6	114.5	1.96	37.4	1,430
20	76	16.2	112.8	2.06	38.6	1,458
40	68	18.5	118.3	2.17	38.4	1,668
60	72	18.7	116.4	2.20	38.3	1,694
80	74	15.8	115.8	2.14	38.9	1,418
CD (P = 0.05)	7.30	2.45	NS	0.07	NS	115.35
<i>Potassium</i>						
0	76	18.8	116.4	2.02	38.5	1,665
20	79	17.2	118.2	2.05	37.9	1,590
40	74	16.8	115.7	1.98	38.3	1,559
60	80	16.7	117.6	2.03	37.8	1,586
80	82	16.8	114.8	2.01	38.1	1,578
CD (P = 0.05)	NS	NS	NS	NS	NS	NS

Table 2. Response and economics of seed-cotton yield to N and P (pooled over 3 years)

Response equation	Optimum rate (kg/ha)	Yield at optimum rate (kg/ha)	Response at optimum rate (kg/ha)	Response (kg/ha)	Gross profit (Rs)	Return (Rs/ha) invested on N or P	R ²
$Y = 872.4 + 15.79 N - 0.106 N^2$	71.44	1,459.69	1,438.32	20.13	9,745	30.11	0.927
$Y = 1,380.6 + 11.795 P - 0.136 P^2$	39.98	1,638.78	1,634.84	40.89	11,186	43.45	0.614

Cost: N and P @ Rs 4.53 and Rs 6.44/kg and cotton @ Rs 7.00/kg

rate of 39.98 kg/ha for P. The response of each kg N and P applied was 20.13 and 40.89 kg/ha respectively. The return/rupee invested on N and P fertilizer was Rs 30.11 and Rs 43.45 respectively.

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Effect of application time and hoeing on efficiency of pendimethalin in cotton (*Gossypium* species)

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Pendimethalin application as pre-emergence has been recommended for annual weed control in cotton (*Gossypium* sp.) (Balyan *et al.*, 1983). However, as the rainy season approaches in June-July, weeds which escape herbicides compete with the cotton and reduce yield (Panwar and Malik, 1991). Besides, hot and desiccating winds reduce the soil moisture and increase volatilization losses of pendimethalin.

A field experiment was conducted during the rainy season (*kharif*) of 1991 and 1992 at research farm, Hisar, to find out the effect of application time on the efficient use of pendimethalin applied in cotton. The soil was low in N, medium in P, and rich in K. It

had 0.4% organic matter and pH 8.0. 'H 777' cotton was sown on 24 May and 18 May in 1991 and 1992 respectively. Fifteen treatments (Table 1) were replicated 3 times in randomized block design. All plots were treated with herbicides immediately after hoeing and irrigated for better distribution. The field was dominated by carpet weed (*Trianthema portulacastrum* L.) and barnyard grass (*Echinochloa crus-galli* Beauv.). All the cultural practices were given in accordance with local package practices. Population of weeds (No./m²) and dry weight of total weeds (g/m²) were recorded with 0.5 m x 0.5 m random quadrat at 90 days after sowing.