

## INFLUENCE OF GRADED LEVELS OF N, P AND K ON GROWTH AND YIELD OF HORSEGRAM \*

Horsegram, a short duration pulse crop is grown as a rainfed crop in areas of low rainfall and soils of low fertility. It is also grown as an inter and mixed crop and as a green manure crop. Published work on the influence of fertilization of horsegram is meagre. Bhattacharya (1971) obtained the highest yields of horsegram by the combined application of 33.5 kg  $P_2O_5$  and 11.25 kg  $K_2O$ /ha under original soil and 22.5 kg to 44.5 kg N in combination with 33.5 kg  $P_2O_5$ /ha in lime dressed soil. Hence a detailed investigation was undertaken at the College of Agriculture, Vellayani, Trivandrum during October-December, 1982 to assess the nutritional requirement of horsegram.

The treatments consisted of three levels each of N (0, 15 and 30 kg/ha), P (0, 25 and 50 kg  $P_2O_5$ /ha) and K (0, 20 and 40 kg  $K_2O$ /ha). The soil of the experimental area is red loam with total nitrogen 0.23%, available  $P_2O_5$  45 ppm and available  $K_2O$  96 ppm with a pH of 5.2. The experiment was laid out in a  $3^3$  confounded factorial design confounding NPK and  $NPK^2$  in replications I and II respectively.

A uniform basal dressing of lime at the rate of 500 kg/ha (KAU, 1981) was given two weeks before sowing. Urea, superphosphate and muriate of potash were used to supply required quantities of N, P and K and were applied before sowing. Seeds of the variety Pattambi local obtained from the Regional Agricultural Research Station, Pattambi, Kerala were treated with rhizobium culture and were dibbled at the rate of two seeds/hole in lines at a spacing of 25 x 15 cm. All the treatments received uniform cultural practices. Harvesting was done thrice by picking mature pods of individual plants and was completed by 75th day after sowing.

Application of 15 kg N/ha significantly increased grain yield over control, the increase being 19.3 per cent. Further increase in nitrogen level resulted in a decrease in grain yield. Phosphorus application at 25 kg  $P_2O_5$ /ha recorded 32.4% increase in grain yield over control but showed a declining trend when the dose was increased to 50 kg/ha. This is in conformity with the finding of Sahu (1973) in horsegram and blackgram. Potassium also showed a similar effect as that of N and P and 20 kg  $K_2O$ /ha produced the highest yield (29.5% increase over control). The significant influence of 25 kg  $P_2O_5$  and 20 kg  $K_2O$ /ha on various yield attributes might have resulted in higher grain yield at these levels of application of nutrients.

The interactions N x P, N x K and P x K were found to have significant effects on grain yield and the treatment combinations  $N_1P_1$ ,  $N_1K_1$  and  $P_1K_1$  were found superior over their respective combinations. The treatment combination  $N_1P_1K_1$  recorded the highest grain yield.

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Table 1

Effect of graded doses of N, P and K on yield and yield attributes of horsegram

Treatments	Pods per plant	Seeds per pod	100 seed wt. (g)	Grain yield (kg/ha)	Bhusa yield (kg/ha)	Dry matter yield (kg/ha)	Harvest index
0 kg N/ha	37.32	5.52	4.13	691.67	899.50	1730.50	0.40
15 "	37.79	5.78	4.23	825.17	999.94	1995.83	0.41
30 "	37.32	5.55	4.18	773.94	1055.89	1954.67	0.38
'F' test	NS	NS	NS	*	*	*	*
0 kg P <sub>2</sub> O <sub>5</sub> /ha	32.58	5.48	4.11	641.22	886.11	1671.55	0.38
25 "	40.79	5.79	4.17	848.83	1026.61	2037.55	0.41
50 "	39.06	5.57	4.27	800.72	1042.61	1271.89	0.41
'F' test	*	*	*	*	*	*	*
0 kg K <sub>2</sub> O/ha	34.86	5.38	4.08	671.67	897.28	1714.00	0.39
20 "	38.87	6.73	4.23	869.89	992.22	2025.33	0.42
40 "	38.70	5.73	4.23	749.22	1065.83	1941.67	0.39
'F' test	*	*	*	*	*	*	*
C. D. (0.05)	1.325	0.241	0.108	18.083	16.850	38.238	0.005

NS= Not significant

\* Significant

The grain yield showed significant and positive correlations with the yield components like number of pods per plant ( $r=0.6101$ ), number of seeds per pod ( $r=0.2739$ ) and hundred seed weight ( $r=0.4080$ ).

Nitrogen and phosphorus showed a linear trend in bhusa yield which might be due to the favourable effects of these nutrients on growth characters, especially branching. The significant positive response of phosphorus was observed at 25 kg P<sub>2</sub>O<sub>5</sub>/ha only. The interactions N x P, N x K and P x K were found significant in this case.

The total dry matter yield and harvest index were significantly influenced by N, P, K and their interactions. Significant positive response was obtained at lower levels of these nutrients. Application of higher levels of these nutrients showed a trend of decline in total dry matter yield. Increase in dry matter yield of *Vigna unguiculata* (L.) Walp by the combined application of N, P and K has been reported by Touvin and Lencrerot (1977).

The study indicated that the highest grain yield was obtained by the application of 15 kg N, 25 kg P<sub>2</sub>O<sub>5</sub> and 20 kg K<sub>2</sub>O per ha in the red loam soils of Vellayani.

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