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RESPONSE OF COWPEA (*VIGA* S/NENS/S ENDL). TO DIFFERENT LEVELS OF N, P & K

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Grain legumes in general give lower yields than the majority of the cereal crops. This may be due to the peculiar conditions in which this crop is grown viz., marginal conditions of moisture stress, low soil fertility and neglected management practices.

Most pulse crops respond to a starter dose of nitrogen. They also show good response to P_2O_5 application. Once we accept the principle that t! pulse crops should recive an improved agronomic management in the same way as cereals, it is highly essential to find out the most economic level of fertiliser application. No detailed study on the response of cowpea to nitrogen, phosphorus and potash has been conducted in Kerala. The present investigation was therefore initiated in order to find out the optimum and economic doses of N, P and K for cowpea under high rainfall conditions.

Materials and Methods

The experiment was conducted in the moderately fertile, lateritic upland soils of the Rice Research Station, Pattambi during the kharif seasons (May-August) of 1975—76, 1976—77 and 1977—78. The treatments csnsisted of three levels each of nitrogen (0, 20 and 40 kg N/ha), phosphorus (0, 20 and 40 kg P_2O_5/ha) and potash (0, 10 and 20 kg K_2O/ha) in all possible factorial combinations. Treated in a randomised block design with two replications totally. The test variety was confounding the higher order interaction N P^2K^2 PTB_1 (Kanakamani), the first released dual purpose cowpea variety of Kerala Agricultural University with 80 to 85 days duration. The fertilisers were applied fully as basal in the form of urea, superphosphate and muriate of potash. Sowing was done by dibbling at a spacing of 30x20 cms with 2 seeds per hole. The gross plot size was 3 m x 2 m. Observations on the data of first flowering, total duration and grain yield were recorded. The data were analysed statistically. Response curve analysis for nitrogen and phosphorus was also done. The results are presented in table 1.

Results and Discussion

Effect of nitrogen:

From table 1, it can be seen that during 1975—76 nitrogen significantly increased grain yield. The yield trend for 0, 20 and 40 kg N/ha was, respectively,

Table 1

Yield of grains in Kg/ha of cowpea nnder different levels of N, P and K.

Years		Nitrogen (N)			Phosphorus (P_2O_5)			Potash (K_2O)		
		0	27	40	0	20	40	0	10	20
			kg/ha	kg/ha		kg/ha	kg/ha		kg/ha	kg/ha
1975—76	Yield	589	659	828	619	703	755	772	603	702
	C. D. (5%)		82			N. S.			82	
1976—77	Yield	915	990	956	937	957	967	925	939	996
	C. D. (5%)		N. S.			N. S.			N. S.	
1977—78	Yield	487	617	502	447	578	580	571	531	503
	C. D. (5%)		75			75			N. S.	
Pooled	Yield	664	755	762	668	746	767	756	691	734
	C, D. (5%)		63			63			N. S.	

589 kg, 659 kg and 828 kg/ha of grain. In the following year the results indicated the same trend although there was no significant difference amongst the levels of nitrogen. In 1977—78, nitrogen again exerted significant increase in production with N at 20 kg/ha producing the highest yield of 617 kg/ha.

The pooled data of three years also showed significant response to applied nitrogen. The yields recorded at 0, 20 and 40 kg N/ha were 664, 755 and 762 kg/ha respectively. The difference between N at 20 and 40 kg/ha was not significant. The reasons for the non linear response might probably be due to the luxuriant vegetative growth contributed by increased nitrogen application.

Effect of phosphorus:

During 1975—76 and 1976—77 the response to applied P was not significant but the trend of the results indicated grain yield increase due to phosphate manuring. But during 1977—78 the effect due to applied P_2O_5 touched the level of statistical significance. The yields recorded at 0, 20 and 40 kg P_2O_5/ha were 447, -578 and 580 kg/ha of grain respectively. The pooled data also showed the same significant trend in grain yield response. But the difference between the levels 20 and 40 kg P_2O_5/ha was not significant.

Effect of potash:

Application of potash did not show any conclusive yield trend. But during two seasons a decreasing trend in yield was obtained due to potash application.The results clearly indicate that application of nitrogen and phosphorus

increases the yield of grain in cowpea. This finding is in agreement with that of Subramanian *et al*. (1977) whose result showed that NPK at the rate of 10:20:5 kg/ha gave the heighest grain yield of 2251 kg/ha when compared to the lower and higher levels. Nangju (1976) also showed that application of nitrogen and phosphorus each at the rate of 30 kg/ha significantly increased the yield of grain. Similar increase in grain yield was also reported by Godfrey-Sam-Aggrey (1973).

From the pooled data it can be clearly seen that the increase in yield of grain recorded at 20 kg/ha levels of N and P_2O_5 was substantial when compared to the marginal shift obtained between 20 and 40 kg/ha levels. Analysis of the response curve indicates that the optimum doses of nutrients for maximum yield of cowpea grain are 31 .67 kg N and 37.37 kg P_2O_5/ha. Considering the prevailing market price of cowpea (Rs. 2 per kg) and cost of N (Rs. 3.58 per kg) and P_2O_5 (Rs 3,94 per kg) the economic doses of fertilizers are 23.13 kg N and 23,55 kg P_2O_5/ha.

Summary and Conclusions

A field trial was conducted at the Rice Research Station, Pattambi to find out the response of cowpea to graded doses of N, P and K, under high rainfall conditions. The test variety PTB_1 exhibited significant response to N and P. The optimum doses of nutrients for maximum yield were 31 .67 kg N and 37.37 kg P_2O_5/ha. The economic doses of fertilisers were, 23.13 kg N and 23.55 kg P_2O_5 per ha Response to applied potash was not significant.

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സംഗ്രഹം

വൻപയറിന്റെ (ഇനം — പി. ടി. ബി-1: കനകമണി) വിളവർദ്ധനവിൽ പാക്യജനകം, ഭാവഹം, ക്ഷാരം എന്നീ സസ്യപോഷകമൂലകങ്ങളും എത്രമാത്രം സ്വാധീനം ചെലുത്തുന്നുവെന്നറിയാൻ പട്ടാമ്പിനെല്ല് ഗവേഷണകേന്ദ്രത്തിൽ 1975 മുതൽ 1977 വരെ നടത്തിയ പരീക്ഷണത്തിൽ നിന്നും പാക്യജനകത്തിനും, ഭാവഹത്തിനും വിളവർദ്ധനവിൽ കാര്യമായ പങ്കുണ്ടെന്നു കണ്ടു.

ഹെക്ടറിന് 31.67 കി. ഗ്രാം പാക്യജനകവും 37.37 കി.ഗ്രാം ഭാവഹവും ഉപയോഗിച്ചപ്പോഴാണു് ഏറ്റവുമധികം വിളവുണ്ടായതെങ്കിലും ഉൽപ്പാദനച്ചിലവും, ഉൽപ്പന്നവിലയുമായി പൊരുത്തപ്പെട്ടുപോകുവാൻ ഹെക്ടറിന് പാക്യജനകം 23.13 കി. ഗ്രാമും, ഭാവഹം

23.55 കി. ഗ്രാമും flj(w1g)CQ)onra മനസ്സിലായി. ക്ഷാരത്തിനു പയറുൽപാദന വർദ്ധനവിൽ കാര്യ മായ പങ്കുള്ളതായി ഈ പഠനത്തിൽ കാണാൻ കഴിഞ്ഞില്ല.

REFERENCES

Godfrey-Sam-Aggrey, W. 1973. Effect of fertilisers on harvest time and yield of cowpea *(Vigna unguieulata)* in Sierra Leone. *Experimental Agriculture* **49,** 748—753.

Nangju, D. 1976. Effect of fertiliser mangement on seed sulphur content of cowpea *(Vigna unguieulata).* Grain legume Bulletin 4, 6—8.

Subramaniam, A. **B**alasubramonian, A. and Venkatachalam, A. 1977. Effect of varying levels of fertiliser and spacing on the yield of cowpea. Madras Agricultural Journal 64, **614**—615.

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