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EFFECT OF LEVELS OF N, P & K ON THE UPTAKE OF NUTRIENTS AND GRAIN YIELD IN COWPEA.

The crop yield is related to the supply of available nutrients in the growth medium and their normal utilization through out the life cycle. There is very little information available in respect of the yield—nutrient uptake relationship of a crop like cowpea.

A field trial in a 3" confounded factorial design confounding NPK[3] in replication 1 and NP[2] K- in replication II, was laid out at the Instructional Farm of the College of Horticulture, Vellanikkara with cowpea variety P-118. The soil of the experimental site was a deep moderately welt drained, medium clay loam with total N. 0.1008 per cent, available P. 0.0004 per cent and available K. 0.0047 per cent and PH 5.1. The levels of the nutrients tested were N-10, 20 and 30kg/ha; P_2O_5—20, 30 and 40 kg/ha and K_20—0,10 and 20 kg/ha. Concentration of N, and K were based on observation plants sampled to estimate yield and its attributes- The regression co-efficient of yield of cowpea on uptake of N and P_2O_5 were worked out and confidence belts for expected mean yields were estimated according to the method suggested by Snedecor *et al* (1967)

The data on the uptake of N by plants at harvest are presented in Table 1. Nitrogen at 20 kg/ha was found to b3 superior to the lower level of 10 kg/ha. The quantity of N absorbed by the crop (when 20 kg/ha was given) was 24.748 kg/ha. But there was no significant difference between 20 and 30 kg levels of nitrogen. A perusal of the yield data (Table 2) points to the fact that. dry matter production and grain yield were also maximum at 20 kg N/ha The significantly higher uptake of N at 20 kg/ha level suggests that the crop requires a reasonably good amount of nitrogen for its proper development and that 10 kg/ha is an insufficient dose to support plant growth and production. The lack of response at the higher level suggests that the crop requirement is met at 20 kg/ha level of applied N along with the symbiotically fixed N. Similar results were obtained by Panwar and Jain (1974) in fodder berseem. The influene of phosphorus on the uptake of nitrogen was also significant. At the 40 kg/ha level of P_2O_5, plants absorbed the highest quantity of nitrogen i. e. 24 2 kg/ha. The favourable influence of phosphorus on dry matter production and the growth characters also might have promoted uptake of nitrogen.

The N uptake—yield relation was linear and N uptake accounted for €8,7 per cent of variations in grain yield. It was seen that 0.06497 kg of N—uptake was necessary for increasing the grain yield by 1 kg. The depen-

Table 1 Effect of levels of N, P and K on the uptake of three nutrients by cowpea (in kg/ha)

Treatments	Uptake of N	Uptake of P	Uptake of K
Nitrogen kg/ha			
10	15.577	2.367	8.963
20	24.748	3.481	12.470
30	23.411	3.191	11.314
F test	Sig.	Sig.	Sig.
SEM ±	0.995	0.137	0.56S
CD (.05)	2.920	0,402	1.665
Phosphorus P_2O_5 kg/ha			
20	18.661	2.(98	9.775
30	20.876	2.989	11.142
40	24.200	3.352	11.832
F test	Sig.	Sig.	NS
SEM ±	0.995	0.137	0.568
CD (0.05)	2.920	0.402	0.568
Potassium K_2O kg/ha			
0	20.955	2.831	10.107
10	20.144	3.082	11.107
20	22.637	3.127	11.578
F test	NS	NS	NS
SEM ±	0.995	0.137	0.568
CD (.05)	—	—	—

dence of N uptake—yield on N rates in the present study corroborates with the findings of Singh and Gupta (1975). The width of confidence interval belt (Fig. 1) increased with N—uptake at a distance from $\bar{x}$ (Mean N uptake 21.25 in this case). Both at very high or low N uptake values, the predicted yield was hazardous.

From the data given in Table, 1, it can be seen that nitrogen significantly influenced the total uptake of phosphorus at harvest. The higher levels of nitrogen were significantly superior to the 10 kg level of N/ha. However, between 20 and 30 kg N/ha there was no significant difference. The reasons for increased uptake of phosphorus by nitrogen application could be mainly two fold. Nitrogen applied at 20 kg/ha promoted not only shoot growth but proliferation of roots also. The increase in root growth might have enhanced absorption of nutrients. Another probable reason is the synergetic effect of

Cofidence belts for mean uptake of N & P

Fig. I

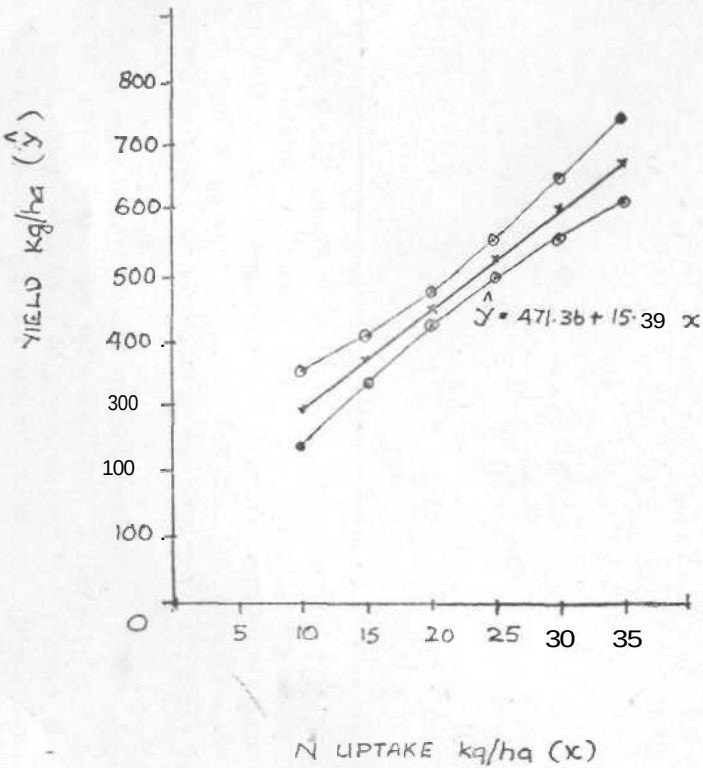

Fig. 11

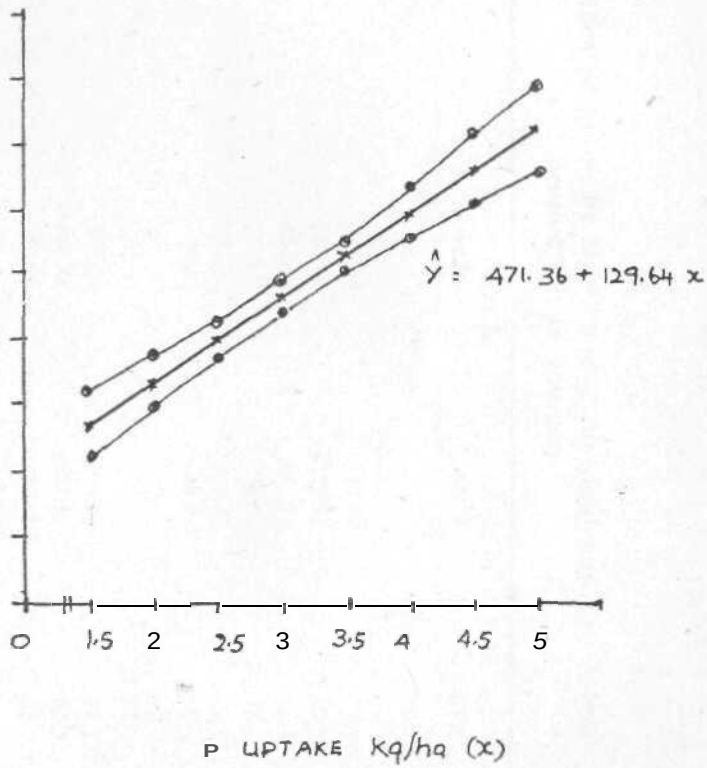

Table 2 Effect of levels of N, P, and K on yield and dry matter production in cowpea.

Treatments	Yield of grains kg/ha.	Yield of haulm kg/ha.	Dry matter yield g/sqm.
Nitrogen kg/ha			
10	396.36	313.89	71.027
20	566.26	383.43	97.277
30	451.44	431.94	88.333
F test	Sig.	Sig.	Sig.
SEM ±	18.02	16.75	2.981
CD (.05)	52.85	49.14	8.45;
Phosphorus P_2O_5 kg/ha			
20	416.54	365.29	78.177
30	446.44	408.79	85.538
40	550.92	355.19	92.927
F test	Sis.	Sig.	Sig.
SEM ±	18.02	16.75	2.881
CD (.05)	52.85	—	8.451
Potassium K_2O kg/ha			
0	464.40	372.69	83.705
10	466.09	365.38	85.455
20	483.58	391.20	87.483
F test	NS	NS	NS
SEM ±	18.02	16.75	2.881
CD (.05)	—	—	—

nitrogen-phosphorus interaction which augmented the absorption of P in plants. P application also significantly increased the uptake of phosphorus by the plants. The 40 kg P_2O_5/ha level registered the highest uptake followed by the 30 kg/ha level, though they were statistically at par. Increased uptake of phosphorus with increasing levels of phosphorus was reported by Sharma and Yadav (1976) in gram.

Phosporus uptake was closely related to grain yield. For 1 kg increase in grain yield, 0 007713 kg of P_2O_5 was removed. The N uptake for a kilogram of grain was about eight times that of phosphorus. The r value (0 855 was significant and linear regression was a better fit. The width of confidence interval belt (Fig. 2) followed the same trend as that of nitrogen. It increased with P-uptake values at a distance from x (Mean P uptake value 3.02) Ni-

trogen exerted significant influence on the uptake of potassium. The 20 and 30 kg levels were significantly superior to 10 kg level of applied nitrogen. The influence of phosphorus on the uptake of potassium was statistically not significant. Applied potassium did not exert any significant influence on the uptake of any of the major nutrients.

സംഗ്രഹം

വെള്ളാനിക്കര ഇൻസ്ടക്ഷനൽ ഫാമി fisi rostOTJilift[1] പരീക്ഷണത്തിൽ നിന്നും, ഹെക്ടറൊന്നിന് 20 കിലോഗ്രാം പാക്യജനകം നൽകിയതു്, പയറിന്റെ വിളവിലും, ആഗിരണം ചെയ്ത പാക്യജനകത്തിന്റെ അളവിന്മേലും ഗണ്യമായ സ്വാധീനം ചെലുത്തുന്നതായി തെളിയിച്ചു. വിവിധ തോതുകളിൽ ഭാവകം നല്കിയപ്പോഴും ഈ ഘടകങ്ങളും വർദ്ധിച്ചു. ഒരു കിലോഗ്രാം പയറുല്പാദിപ്പിക്കാൻ വേണ്ട ആഗിരണം ചെയ്ത നൈടജന്റെയും ഫോസ്ഫറസിന്റെയും അളവ് 0,06497 കിലോഗ്രാമും 0.007713 കിലോഗ്രാമും മിതമാണെന്നും കാണാൻ കഴിഞ്ഞു.

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