Agric. Res. J. Kerala 29 (1991) : 49 - 52

PHOSPHORUS NUTRITION OF GREEN GRAM

The total production as well as productivity of pulse crops in India is very low. Lack of high yielding short duration varieties and want of appropriate agrotechniques are the main reasons for the low production. In this investigation. Performance of four high yielding green gram varieties was studied under different levels of phosphorus.

The study was conducted as factorial experiment in randomised block design replicated thrice. The treatments consisted of four varieties of green gram (Pusa Baisaki, S-8, Co-2 and Madira) and four levels of phosphorus (0, 15, 30 and 45 kg P_2O_5/ha). The crop was supplied with N, K_2O and lime at the rates of 20, 10 and 500 kg/ha, respectively. The spacing adopted was 20 x 10 cm. The experiment was conducted at the College of Horticulture, Vellanikkara. The soil of the experimental site was medium clay loam analysing 0.115% N, 0.0339% total P_2O_5, 0.201% total K_2O with a pH of 5.1.

Among the four varieties, Co-2 exhibited the highest LAI, which was significantly superior to the other varieties (Table 1). A similar pattern was observed with respect to the total dry matter production also. However, the net assimilation rate did not show significant variation. The highest NAR was recorded by S-8 followed by Madira. Inspite of a higher LAI and dry matter production, Co-2 did not show a higher NAR and this probably could be due to the inverse relationship that existed between LAI and NAR, particularly at high LAI. Though the different phosphorus levels did not exert significant influence on LAI, NAR and dry matter production there was an increase in all these growth indices with the increase in phosphorus levels (Table 1).

With respect to the uptake of N and K, neither the varieties not the P levels had any significant influence. However, P uptake varied significantly, the variety Co-2 recording the highest uptake. The different levels of P also had a significant influence on P uptake. The increase in P uptake with incremental doses of P is due to the favourable influence of P on the growth characters as well as on P content of the plant.

The variety Co-2 produced the highest number of pods per plant, which was significantly superior to Pusa Baisaki and Madira and was on par with S-8 (Table 2). The higher number of pods by Co-2 can be attributed to the significant superiority of this variety with respect to the growth characters like leaf area index and dry matter production. The significant influence of phosphorus in increasing the number of pods per plant is also evident from the data.

The higher levels of phosphorus would have increased the available phosphorus content in the soil which in turn would have stimulated the plant to produce more number of pods per plant. This observation is in conformity with the finding of Dixit and Swain (1987) in green gram.

The varietal influence was significant in increasing the number of seeds per pod. The variety Co-2 registered the maximum number which was significantly superior to that of variety S-8, but was on par with that of Pusa Baisaki and Madira. The different

Table 1. Leaf area index (LAI), net assimilation rate (NAR), dry matter production and uptake of nitrogen, phosphorus and potassium at 60 DAS as influenced by varieties and different levels of phosphorus

Treatments	LAI	Dry matter (kg/ha)	NAR (40-60 DAS) ($g/cm^2/day$)	Uptake (kg/ha)		
				N	P	K
Varieties						
Pusa Baisaki	1.02	592.0	2.99	23.77	1.93	40.59
S-8	0.91	605.9	4.15	29.89	2.27	50.26
Co-2	2.22	1619.5	2.76	31.87	5.78	72.86
Madira	0.90	820.5	3.36	28.68	2.29	47.42
SEm±	0.27	204.3	0.46	4.41	0.99	10.59
CD (0.05)	0.78	589.9	NS	NS	2.86	NS
Levels of P (kg P_2O_5/ha)						
0	1.05	894.3	3.44	23.75	1.50	43.67
15	0.86	584.8	2.76	21.76	1.47	32.93
30	1.70	1112.1	2.96	34.10	4.33	68.69
45	1.44	1046.8	4.10	34.54	4.41	65.85
SEm±	0.27	NS	0.46	4.14	0.99	10.59
CD (0.05)	NS	NS	NS	NS	2.86	NS

DAS = Days after sowing

Table 2. Yield and yield attributes as influenced by varieties and levels of phosphorus

Treatments	No.of pods per plant	No.of seeds per pod	Hundred seed weight (g)	Yield of grain (kg/ha)	Yield of stalk (kg/ha)	Harvest index (kg/ha)
Varieties						
Pusa Baisaki	5.95	11.33	2.54	365.0	604.6	0.39
S-8	6.45	10.67	2.60	421.7	799.7	0.32
Co-2	8.20	12.50	2.39	627.4	1579.8	0.30
Madira	4.30	11.75	2.72	407.8	700.0	0.40
SEm±	0.76	0.41	0.06	39.5	80.4	0.02
CD (0.05)	2.19	1.17	0.19	114.3	232.2	0.05
Levels of P (kg P_2O_5/ha)						
0	5.48	11.08	2.50	358.5	698.6	0.34
15	5.35	11.67	2.52	416.9	679.5	0.36
30	6.38	11.75	2.61	505.0	1248.9	0.34
45	7.68	11.75	2.63	541.6	1075.7	0.37
SEm±	0.76	0.41	0.06	39.5	80.4	0.02
CD (0.05)	2.19	NS	NS	114.3	232.2	NS

levels of phosphorus could not exert any significant influence (Table 2).

Significant varietal variation was observed in hundred seed weight. Madira had the highest hundred seed weight followed by S-8, Pusa Baisaki and Co-2. The different levels of phosphorus had no influence on hundred seed weight (Table 2).

The variety Co-2 produced the highest grain yield which was significantly superior to all the other three varieties (Table 2). Co-2 produced an yield of 623 kg/ha which was 72 per cent higher than Pusa Baisaki, 49 per cent higher than S-8 and 54 per cent higher than Madira. As the variety Co-2 produced the highest number of pods per plant as well as the highest number of seeds per pod, the two important yield contributing factors, it is but natural to get higher grain yield from this variety. This observation is in conformity with the findings of Veeraswami *et al*. (1973) who obtained 17 per cent higher yield for Co-2 as compared to that of Pusa Baisaki.

It is also evident from the data that phosphorus significantly increased the yield of grain. The increase in yield may be due to the established beneficial effects of phosphorus like better root development, flower primordia initiation, stimulation of growth and formation of seeds. Such increase in the yield of green gram by the higher levels of phosphorus has been reported by Singh *et al.* (1975), Patel *et al.* (1984) and Dixit and Swain (1987).

The harvest indices of the varieties Madira and Pusa Baisaki were significantly superior to Co-2 and S-8 (Table 2). However, both Co-2 and S-8 recorded higher yields than the other two varieties. The low harvest indices of Co-2 and S-8 may be due to their higher haulm yield which is an indication that the ability of these two varieties to divert photosynthate to the economic part is lower than that of the other two varieties.

Phosphorus had no significant influence on the harvest index and is justified by the fact that phosphorus had significant influence on the vegetative growth as well as on the grain yield.

This paper forms a part of the M.Sc. (Ag.) thesis of the senior author submitted to the Kerala Agricultural University.

College of Horticulture
Vellanikkara 680 654, Kerala, India

P.V. Balachandran
V.K. Sasidhar

REFERENCES

Dixit, L. and Swain, N. 1987. Response of green gram varieties to phosphate fertilization. *Indian J. Agron.* 32: 284-285

Patel, R.G., Patel, M.P., Patel, H.C. and Patel, R.B. 1984. Effect of graded levels of nitrogen and phosphorus on growth, yield and economics of summer mung bean. *Indian J. Agron.* 29: 291-294

Singh, K.K., Hassan, W., Singh, S.P. and Prasad, R. 1975. Response of mung to graded levels of N and P *Indian f. Agron.* 20: 182-185

Veeraswami, R., Rathnaswami, R. and Krishnaswami, S. 1973. Co-2 green gram an early maturing and high yielding new strain. *Madras agric. J.* 60: 1829-1830

□□□