

EFFECT OF PHOSPHORUS, LIMING AND RHIZOBIAL INOCULATION ON YIELD AND YIELD ATTRIBUTES OF SOYBEAN

Soybean is an excellent source of plant protein and vegetable oil. An experiment was conducted at the College of Horticulture, Vellanikkara from July to October 1978 adopting factorial randomised block design, there being three replications consisting of 16 combinations of four levels of phosphorus (0, 30, 60, 90 kg P_2O_5 /ha), two levels of lime (0 and 250 kg lime/ha.) and two levels of rhizobial inoculation (with and without inoculation). The soil in the plot was deep, moderately acid, medium clay loam, fairly rich in organic matter with a pH of 6.00 and contained 0.0882%, 1.82 ppm, 275 ppm and 475 ppm of total nitrogen, available phosphorus, available potassium and exchangeable calcium respectively.

Soybean seeds of variety UGM-20 were dibbled so as to finally retain 20 plants per row at an average spacing of 5 cm between plants and 45 cm between rows. Lime was broadcast and raked into soil two weeks before sowing and the fertilizers were applied 3 days prior to sowing. Rhizobium culture obtained from the Tamil Nadu Agricultural University was used with jaggery syrup as the sticker material.

Grain yield was not significantly affected but there was an increasing trend with increasing levels of applied phosphorus. The result observed is in agreement with the trend noticed in the case of yield components. This points to the fact that availability of phosphorus in the soil was adequate enough both in terms of direct requirement of phosphorus for the growth of the crop and also for effective nodulation and nitrogen fixation. Increase in yield consequent on the application of phosphatic fertilizers had been reported by Dutra *et al.*, (1975) Kesavan and Morachan, (1973), and by Ferrari *et al.* (1976). On the other hand, Mascarenhas and Kiihal (1974) and Sable and Khuspe (1976) could not get yield increase in soybean due to application of phosphatic nutrients.

There was no significant increase in yield due to application of lime. This trend is explainable on the basis of the fact that for this particular variety, the soil supply of calcium was adequate enough both directly as a source of nutrient and indirectly for effective nitrogen fixation. The soil analysis data will also substantiate partly such a trend, as the original calcium level also was comparatively high.

Inoculation with rhizobium culture did not result in a significant increase in yield as expected. On the contrary, the mean yield of the inoculated series was slightly lower than the uninoculated set. The mean yield of the crop was fairly high and was comparable to the yield figure reported in literature. Such a result points to the fact that the crop did not suffer for want of symbiotically fixed nitrogen. There was also no visual symptom of nitrogen starvation of the crop. Similar result was observed in the experiment conducted earlier (Nair, 1978). It may thus

Table 1

Effect of phosphorus nutrition, liming and rhizobial inoculation on yield attributes and yield of soybean.

Treatment	No. of pods/ plant	Test weight, g/1000 seeds	Yield (kg/ha)	
			Grain	Stover
<i>Levels of phosphorus kg P₂O₅/ha</i>				
0	30.81 (5.55)	94.60	2127.7	2356.6
30	24.77 (4.98)	96.35	2216.0	2559.7
60	29.93 (5.47)	96.35	2365.5	2519.7
90	28.90 (5.38)	96.58	2379.0	2957.6
F test	NS	NS	NS	Sig.
SEm \pm	0.297	1.76	94.76	171.6
C. D. at 5%	—	—	—	322.22
<i>Levels of lime kg/ha</i>				
0	28.29 (5.32)	94.58	2253.0	2589.7
250	28.83 (5.37)	94.43	2290.7	2606.08
F test	NS	NS	NS	NS
SEm \pm	0.210	1.24	67.10	89.99
C. D. at 5%	—	—	—	—
<i>Rhizobial inoculation</i>				
Inoculated	26.47 (5.15)	97.13	2335.4	2668.0
Uninoculated	30.72 (5.54)	93.88	2208.3	2528.5
F test	NS	NS	NS	NS
SEm \pm	0.210	1.24	67.10	89.99
C. D. at 5%	—	—	—	—

Figures in parenthesis indicate values after angular transformation.

be concluded from the result that there was not only adequate number of effective strains of rhizobial species originally in the soil but also that the strains introduced were less effective on soybean.

Stover yield was significantly increased by increasing levels of phosphorus. Highest level of 90 kg P_2O_5 /ha was significantly superior to all other levels. But, liming and rhizobial inoculation failed to exert any significant effect.

Results reveal that applied phosphorus did not significantly affect grain yield or yield attributes. The stover yield was increased with higher doses of phosphorus. Liming and rhizobial inoculation had no effect on the yield and yield attributes.

The authors are grateful to the Associate Dean, College of Horticulture for providing necessary facilities for this study. Thanks are also due to Sri. P. K. Ashokan, Assistant Professor College of Horticulture, Vellanikkara and to my colleagues for the helps rendered.

സംഗ്രഹം

സോയാബീനിന്റെ വിളവ് വർദ്ധിപ്പിക്കുന്നതിൽ ഭാവനം, കൃത്യായം, റൈസോബിയം എന്നിവയ്ക്ക് യാതൊരു പങ്കുമില്ലെന്ന് വെള്ളാനിക്കര ഹോർട്ടിക്കൾച്ചർ കോളേജിലെ പരീക്ഷണങ്ങൾ വ്യക്തമാക്കി.

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