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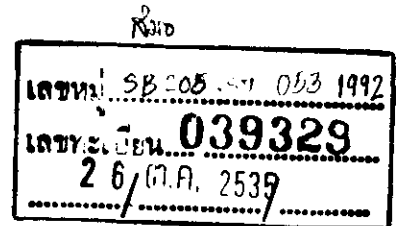
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On Farm Optimization Of Biological Nitrogen Fixation Of
Grain Legumes

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Abstract

The Commission of the European Community (EC) had funded a 3-year project to find the important limiting factors influencing BNF system and to improve soybean grown in acid infertile soils of Thailand. Field trials, the Research Managed-Experiment (RME) and the Farmer Managed - Experiment (FME) were commenced in early 1990 at two sites, Chiang-Mai (northern part) and Phatthalung (Southern part) provinces. Relative ureide, as N_2 fixation index, nodulation, grain yield and some yield components, Total and content of N and P in whole shoots of soybean were recorded. Three experiments were conducted in Chiang-Mai while only two were carried out in Phatthalung. In the first year of RME, P and K fertilizers were applied at the rate recommended by the Department of Agriculture in the presence of lime to determine whether the optimum BNF could be obtained. Two Bradyrhizobium japonicum strains, THA 7 (Thai strain) and SMGS-1 (France strain) were included for a comparison. Treatment received full supplied of N (280 kg N/ha) was used as a control treatment. No response to treatment applications was observed in Chiang-Mai site while significant responses to treatments were observed in Phatthalung. Phosphorus at the rate recommended (56.25 kg P_2O_5 /ha) was inadequate for maximum yield and N_2 fixation. Similar yield response to P was observed in the FME. THA 7 strain was slightly superior to SMGS-1 under acid soil conditions. In the second year experiment where rate of P was increased to 60 kg P_2O_5 /ha. Plants were grown in the presence and absence of P and trace elements in order to further confirmed either P or trace elements was a major limitation to yield and N_2 fixation. Results in both sites clearly demonstrated that maximum yield were obtained when P was applied. Unfortunately optimum rate of P for BNF and yield could not be obtained from the experiment in the third year. The effect of VAM involvement in non responding to rate of P application was discussed. However, it was cleared soybean could be grown and produced high yield in acid soil low in P in the South of Thailand, when adequate P fertilizer applied and seeds were inoculated with effective rhizobial strain. As P was a major limitation of BNF and yield, P concentration in shoot at approximately R_3 stage seemed to be a good parameter to predict yield.