

Thesis

On Farm Evaluation of Nitrogen Fixing Ability
of Various Soybean Cultivars by Indigenous
Rhizobia

Author

Pathipan Sutigoolabud

M.S.(Agriculture)

Soil Science

Examining Committee

Assist.Prof.Dr.Ampa Bhromsiri

Chairman

Assoc.Prof. Chalermpon Sampet

Member

Assoc.Prof.Dr. Benjavan Rerkasem

Member

Lecturer Phrek Gypmantasiri

Member

Abstract

An evaluation of nitrogen fixation of 17 soybean cultivars by indigenous rhizobia in the traditional soybean - growing area was conducted in a farmer's field in Hang Dong district, Chiang Mai Province, during the cool dry season, after rice cultivation. The selected field has never been inoculated. The ureide technique was used for estimation of N_2 fixation. N-fertilizer was not applied and the cultural practices of the farmer were used.

The maximum nodule dry weight of most cultivars were obtained at R₅ to R₈ stages of growth. There were six to nine cultivars which produced lower nodule dry weight ($P < 0.01$) than SJ.5, the standard cultivar, at R₂ and R₃ stages. The relative ureide index of most cultivars ranged from 54 - 88 % at R₂. The maximum relative ureide index ranging from 79-88 % were reached mostly at R₃ to R₅ stages. At R₂, six cultivars had lower relative ureide index than SJ.5 and three cultivars were lower at R₃ and R₅ ($P < 0.01$). Significant correlations ($P < 0.01$) between nodule dry weight and relative ureide index were found at R₃ and R₈. The amount of N₂ fixed up to R₈ ranged from 34-107 kg N/ha ; which were about 64-86 percent of the total nitrogen accumulated in the above ground parts of soybeans. At R₈, the dry matter of the tested cultivars varied from 1345 to 6366 kg/ha and N uptake were 46 to 126 kg N/ha. There was only one cultivar, G 3517, which gave significantly higher dry matter and N uptake than SJ.5 at R₂ to R₈. At R₈ stage two cultivars, G 3517 and IITA medium, had significantly higher N uptake than SJ.5 ($P < 0.01$) and one cultivar, Williams, was lowest.

Among the 17 cultivars tested, there were ten which gave 17 to 40 % more seed yield than SJ.5, however the differences of seed yield among all cultivars were not significant.

Nodule dry weight at various stages of growth and percentage of N₂ fixed to the total N accumulated in the above ground part were used as criteria to indicate the compatibility to indigenous rhizobial strains of soybean genotypes. The cultivars tested are classified into 4 groups. The first group, was compatible with the indigenous strains having the same nodule dry weight and percentage of N₂ fixed as SJ.5. These were Cao Bang, IITA medium, SJ.4, CMU 001, SK.1 and Dempo. The second group consisted of CM 60, G 3517, AGS 129, Buchanan and Valder were moderately compatible. These cultivars produced lower nodule dry weight than SJ.5 at V_s to R₃ but had the same percentage of N₂ fixed as SJ.5. The third group was moderately low in compatibility, consisting of Williams, Galunggung, Bossier and NW.1. These cultivars produced lower nodule dry weight at V_s to R₃ and had lower percentage of N₂ fixed than SJ.5. These was only one cultivar, Pak Chong as the forth group with low compatibility. The cultivar had similar nodule dry weight as SJ.5 but the percentage of N₂ fixed was the lowest among all cultivars.