

Thesis Title Nitrogen Fixation of Soybeans (Glycine max (L.)
Merr.) under Different Growing Seasons

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Abstract

A study on nitrogen fixation of soybeans under different growing seasons was carried out at the Multiple Cropping Center Research Station, Faculty of Agriculture, Chiang Mai University. Five soybean varieties, Nakornsawan 1, SJ.1, SJ.5., Willis and Sukhothai 1, were grown during the late rainy season (October, 1988-January, 1989), dry season (January-April, 1989), and early rainy season (May-September, 1989). Estimates of soybean nitrogen fixation were made by xylem sap analysis.

Soybeans sown in the late rainy season accumulated the lowest amounts of dry matter (3,000 kg/ha or less); the highest amounts of dry matter were accumulated during the early rainy season (10,000 to 14,000 kg/ha). The five soybean varieties grown in all seasons, Wilis accumulated the largest amounts of dry matter in the late and early rainy seasons and SJ.5 in the dry season. In contrast, Nakornsawan 1 had the lowest dry matter in every season.

The amount of nitrogen fixed to full seed stage (R6) for the five varieties averaged 85 kgN /ha in the late rainy season, 133 kgN /ha in the dry season, and 191 kgN /ha in the early rainy season which were equivalent to 81%, 72% and 58% of total plant nitrogen, respectively. In the late rainy season, the amount of nitrogen fixed did not differ significantly among the soybean varieties. The biggest differences between varieties were recorded in the dry season, when Sukhothai 1 fixed 172 kgN /ha compared with 100 kgN /ha in Nakornsawan 1. For the early rainy season, the highest amount of nitrogen, 225 kgN /ha, was fixed by Sukhothai 1 and SJ.5, the lowest amount of nitrogen, 169 kgN /ha, was fixed by Nakornsawan 1, Wilis and SJ.1.

If the amount of nitrogen removed in the harvested seed is considered as the output from the system and nitrogen fixed is the input, in the dry season, soybeans depleted soil nitrogen by 27 kgN /ha while in the late and early rainy season there was a slight positive balance of nitrogen. In every growing season, Sukhothai 1 had the best potential for maintaining nitrogen balance while Wilis was the least.