

Abstracts

Nitrogen plays an important role in cereal crops production in upland areas. It is unlikely for farmers to use N-fertilizer to improve their crops yield. The introduction of N-fixing grain legumes which help maintain soil fertility could be an alternative for the farmers. However, soil fertility depends on N-balance between N-derived from fixing and N-removed (remained in crop yields). The objectives of this study is to investigate N-fixing and N-balance after soybean and green gram have been introduced to the systems.

An experiment was conducted at Mae Hea Research and Training Centre, Faculty of Agriculture, Chiang Mai University from May 1991 to April 1992. Soil was loam, pH 5.1, OM 1.03%, P 29 ppm and K 55 ppm.

Six cropping systems consisted of 1) Corn-Wheat 2) Soybean-Wheat 3) Green gram-Wheat 4) Soybean-Soybean 5) Green gram-Green gram and 6) Corn-Soybean were laid out in randomized complete block design with four replications. The wheat plots of system 1 and the corn plots of system 6 were fertilized with N-fertilizer at the rate of 0, 50, 100 and 200 kg N/ha and 0, 100 and 200 kg N/ha respectively.

At the first growing season (at early rain), The accumulation of DM and N of soybean was twice as much of that green gram. N derived from N_2 fixation 112.5 kg N/ha and 28.0 kg N/ha or equivalent to 41% and 25% of the total crop N respectively. After crop were harvested, soybean gave net N-balance +11.6 kg N/ha compared to -41.9 kg N/ha for green gram and -66.6 kg N/ha for corn. Wheat sown after soybean or green gram gave a higher seed yield than wheat sown after corn. The increasing yields equivalent to the application of N at the rate of 100-200 kg N/ha. At second growing season (late rain, was no significant difference in both DM and N accumulation between soybean and green gram, but lower than those previous growing season. N_2

fixation of soybean was between 34.8-60.6 kgN/ha (depends on treatments) and that of green gram was 34.3 kg N/ha or equivalent to 47.8% - 68.1% and 47.0% of the total crop N respectively. The net N balance -7.0 to + 4.9 kg N/ha were recorded from soybean, -15.3 kg N/ha from green gram and -25.1 kg N/ha from wheat when they were sown as a second crop.

The comparison of net N balance of all cropping systems showed that most systems gave net N balance ranged -34.5 to -91.7 kg N/ha, except for the soybean-soybean system that gave +16.5 kg N/ha. The corn-wheat system had the lowest net N balance (-91.7 kg N/ha). The residual effect of N on N_2 fixation of soybean was not observed.

The values of N balance present in this report could be over estimated because the amount of N remained in the fallen leaves, roots and nodules was not accounted.