105/B

Mineralization and release of nitrogen and phosphorus from tropical tree legume leaves decomposing in soil

S D Wanniarachchi* and A P Senanayake
Department of Agricultural Chemistry, Faculty of Agriculture, University of Ruhuna, Kamburupitiya

Information on the release of nitrogen and other nutrients from tropical tree legumes is vital to adopt crop nutrient management systems that minimize the use of chemical fertilizers and increase the productivity of soil. Mineralization and release of nitrogen and phosphorus were determined for five tropical tree legume leaves in a laboratory incubation experiment. A Red Yellow Podsolic soil (Hapludults) with a loamy sand texture was used for the incubation. Ground leaf materials of *Sesbania*, *Erythrina*, *Leucaena*, *Gliricidia* and *Calliandra* were allowed to decompose in soil for ten weeks at the rate of 5 MT/ha (dry matter). A urea amended and control soil treatments were also included in the experiment for comparison. Soil was analyzed periodically (at 3 days and thereafter at weekly intervals) for pH, water extractable organic carbon, soil microbial biomass carbon, inorganic/available nitrogen (NH_4^+-N and NO_3^--N) and borax extractable phosphorus. Carbon mineralization and soil microbial activity was also measured using CO_2-C evolved during the incubation.

Application of plant materials to soil resulted in a significant increase of CO_2-C evolved from soil up to 14 days incubation. Of the tree legume leaves incubated with the soil, *Sesbania* had the highest and rapid release of nitrogen followed by *Leucaena*, *Gliricidia*, *Erythrina* and *Calliandra*. The highest quantity of inorganic N was observed after about four weeks of the incubation. The release of NH_4^+-N was highly varied among all treatments; however, the treatment effect was significant ($P<0.05$) throughout the incubation period. NO_3^--N content in soils of all treatments including control soil was increased throughout the incubation due to nitrification. *Sesbania* recorded the highest NO_3^--N content while the control soil without fertilizer recorded the lowest at the end of the incubation period. Total inorganic N in soil (NH_4^+-N and NO_3^--N) recorded at the end of the incubation (70 days) was 101 mg/kg of soil treated with *Sesbania* compared to 46, 51 and 88 mg/kg of soil treated with *Calliandra*, control soil and urea amended soil, respectively. Release of P from all treatments was highly variable and not significant throughout the incubation and the extractable P in soils from all tree legume leaves were comparable to that of control soil. Results of this study indicate that tree legume leaves are good suppliers of N for crop growth and the release of nitrogen could be synchronized with crop growth to minimize the usage of chemical fertilizers and N losses from soil.