



18th World Congress of Soil Science
July 9-15, 2006 - Philadelphia, Pennsylvania, USA



Saturday, 15 July 2006
133-21

Soil Fauna Management in Amazonia: Making use of  Ecological Services  in Agroecosystems.

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Slash-and-burn is the common land preparation technique in Amazonia. Agroforestry systems and mulching have often been proposed as alternative, fire-free techniques. The effects of soil organisms on soil fertility have been analyzed with different approaches, and the effects of the agroforestry systems and of mulching on soil organisms have been assessed in order to find approaches to enhance the beneficial soil fauna. The enhancement of litter decomposition rates by soil macro- and mesofauna (respectively, large and small soil arthropods) in central Amazonian agroforestry systems was shown in a litterbag experiment. The experiment also showed the positive effects of the soil fauna assemblage on nitrogen concentrations in the litter. Termites in particular have positive effects on the physical soil structure by their burrowing activities, and they influence important chemical characteristics of the organic soils such as lignin content and its degree of degradation. All these aspects are related to the fertility of soils, and therefore, enhancing beneficial soil organisms in farming systems helps reducing external inputs, an important feature for resource-poor farmers in the tropics. How can farming systems be managed to improve the effects of soil organisms in the soil? One option is mulching; mulching cassava fields with wood chips increased earthworm populations and had positive effects on the aggregate size in the soil. The mulching initially reduced the nitrogen content of the litter layer, resulting in higher C/N ratios, i.e. a lower initial degradability of the mulch which contributes to the longer duration of the mulch layer. Another option lies embedded in the features of the agroforestry systems themselves. One of our studies showed a direct effect of the degree of canopy closure on the microclimatic conditions of the soil (e.g.; soil temperature), which, in turn, controlled selected elements of soil fauna communities such as the macrofauna or termite assemblages. Resource availability or crop diversity seemed to have lesser effects. Further research will be needed, but based on these data it seems possible to optimize agroforestry systems to draw  ecological services  from the beneficial soil decomposer community into these systems, which will allow reducing external inputs.

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