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UREASE AND ACID PHOSPHATASE ENZYME MODULATION IN RUBBER PLANTATIONS UNDER THE INFLUENCE OF COVER CROPS AND RUBBER LITTER

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Soil urease and phosphatase enzymes play a major role in the mineralization process of organic substrates and their activities were influenced by numerous factors of which soil properties play a key role. The influence of litter from cover crops (*Pueraria phaseoloides* and *Mucuna bracteata*) and rubber (*Hevea brasiliensis*) on the dynamics of urease and acid phosphatase enzymes in the plantation floor of rubber in the traditional region of cultivation was monitored continuously for three years through a field experiment. Pre-calculated quantities of different litter were subjected to natural decomposition in soil and the soil samples were retrieved and activities of urease and phosphatase were monitored twice in a year. The results indicated that both enzyme activities were higher in plots with *Pueraria* than *Mucuna* or rubber. The urease enzyme activity ranged from 77.4 to 179.5 ppm of urea hydrolyzed g^{-1} of soil hr^{-1} and the phosphatase enzyme activity ranged from 230.5 to 482.0 μg of p-nitrophenol released g^{-1} of soil hr^{-1}. Urease maintained significant negative correlations with pH in all the treatments. Positive significant correlations were recorded for urease and acid phosphatase activity with total N in the case of leguminous cover crops.

Key words: Cover crops, Litter degradation, Mineralization, Soil enzymes

INTRODUCTION

Enzymes in a soil system determine to a large extent the biochemical activities and soil quality. Enzymes which originate within the cells of soil organisms or plant roots (endo-cellular) or which accumulate outside them (extra-cellular) regulate the mineralization process (Speir and Ross, 1978). Since these components respond very sensitively to environmental stresses, natural and anthropogenic disturbances *etc*. their levels in soils fluctuate with the soil system. Any healthy soil could necessarily support high content of organic biomass, biological and enzyme activities which support various nutrient cycles to operate (Sajjad *et al*., 2002). Leguminous cover crops are widely accepted for their contribution to soil quality through biomass addition and enrichment of soil C and N (Fageria *et al*., 2005). As phosphorus is often the most limited nutrient in tropical soils, inclusion of leguminous cover crop on tropical soils may seem counter-intuitive. Leguminous cover crops influence the soil P forms through the addition of soil organic

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