Microbial biomass and activity in two cultivation systems on the SHIFT experimental area near Manaus

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The rhizosphere soil, defined as that volume of soil adjacent to and influenced by plant roots, represents a region of high microbial activity.

Very little is known about the effects of trees on microbial biomass and activity in the rhizosphere, and no information is available for cropping systems in the Amazon basin.

In two different cultivation systems we investigated the microbial biomass and activity in the rhizosphere of *Theobroma grandiflorum* and *Bactris gasipaes*, two important crop plants in sustainable agriculture in Brazil during rainy and dry season 1998.

We measured the microbial biomass using the fumigation-extraction method. To determine the specific respiration rate we measured the basal respiration with IRGA without substrate addition. The C-efficiency was calculated using the metabolic quotient (qCO_2) which is defined as the respiration rate per unit microbial biomass. The smaller the value for qCO_2 the more carbon is used to produce biomass. Small values for qCO_2 indicate more effective use of carbon sources as less carbon is lost for respiration.

The concentrations of microbial C were higher in the rainy than the dry season but no differences were found between the cultivation systems or between plant species. However, the qCO_2 was lower in dry season, indicating increasing C assimilation efficiency. In both cultivation systems C efficiency was higher for *T. grandiflorum* than for *B. gasipaes*. The observed differences in C efficiency are probably due to differences in the species composition of the microbial community.

Positive correlation coefficients between microbial biomass, microbial respiration and gravimetric water potential indicate that water is the main factor that influences the biomass and activity of microorganisms in both cultivation systems.