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Water and nutrient fluxes as indicators for the stability of different land use systems on the Terra firme near Manaus

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Water and nutrient fluxes ...
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8) Litter quality effects on decomposition by diplopodes and ^{15}N recovery of central Amazonian agroforestry tree species

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Few attempts have been made to investigate the role of single soil fauna species in controlled laboratory incubation to describe litter decomposition in tropical agroforestry systems. Since a few macrofaunal species can be largely responsible for weight loss, studying these might reveal some basic information about the macrofaunal influence on decomposition. Leaves of different tree-species were incubated in semi-microcosms above soil for 45 days. Leaf-litter enriched from seven species of interest for central Amazonian agroforestry was incubated with three species of diplopods, *Pycnotropis sigma*, species A2 and A3 (not yet identified) and two control treatments (with and without litter) in a randomized complete block design with six replicates. The third diplopod species was used on three litter species only. Animals were replaced on death. 50 mL water was applied every four days and percolate was collected one day later. Samples were pooled to four samples for analyses of inorganic and organic N and one composite sample for ^{15}N isotope analysis. At the end of the experiment after 6 weeks, litter and animal weights were determined, as well as total N and isotope ratios in litter, animals and soil samples. Leaves were additionally analyzed for water-soluble polyphenols.

Litter weight loss decreased in order *Bactris gasipaes* > *Bixa orellana* > *Pueraria phaseoloides* > *Paullinia cupana* var. *sorbilis* > *Bertholletia excelsa* > *Vismia cayennensis* > *Theobroma grandiflorum* without diplopods and with *Pycnotropis sigma*. Decomposition of *Bixa* was highest with abundance of A2 and A3. During incubation with A3 decomposition of *Paullinia* was less than *Bixa* and *Bertholletia* showed the lowest weight loss. All litter species decomposed more rapidly with than without diplopods. The weight loss was not correlated with initial polyphenol-to-N ratios of the leaves. Decomposition of *Bactris* leaves was mainly mitigated by microfauna and mechanical leaching.

Nitrogen leaching was highest in *Bactris* and *Pueraria* and did not correspond with ^{15}N accumulation in animals. In incubation with *Bixa*, ^{15}N contents in the soil corresponded with accumulation in the animals. Nitrogen release in *Bactris* was mainly mitigated by microfauna, while in *Bixa* most nitrogen was released by the animals during defecation.