



Deutscher Tropentag, October 9-11, 2002, Witzenhausen  
“Challenges to Organic Farming and Sustainable Land Use  
in the Tropics and Subtropics”

**Role of Diplopods in Decomposition and Nitrogen Release from  
Litter of Different Qualities in Central Amazonian Agroforestry**

DANIEL SEITZ<sup>1</sup>, JOHANNES LEHMANN<sup>2</sup>, MARCUS GARCIA<sup>3</sup>, WERNER HANAGARTH<sup>4</sup>, KLAUS H.  
HOFFMAN<sup>1</sup>, WOLFGANG ZECH<sup>5</sup>

<sup>1</sup>*University of Bayreuth, Chair of Animal Ecology, Germany*

<sup>2</sup>*Cornell University NY, Department of Crop and Soil Science, United States of America*

<sup>3</sup>*Embrapa Amazonia Ocidental, Brasil*

<sup>4</sup>*State Museum of Natural Sciences, Department of Zoology, Germany*

<sup>5</sup>*University of Bayreuth, Institute of Soil Science, Germany*

**Abstract**

Management of advanced agroforestral polycultures includes optimised synchronization of crop demand and nutrient release from litter. The importance of macrofauna in determining decomposition and nutrient release patterns in the tropics has been shown in various studies, but the nutrient pathways and ecological characteristics have not been elucidated.

A new approach of microcosm experiment has been developed to study the interaction of diplopods with microbes in decomposition of seven major leaf litter types occurring in a central Amazonian agroforest. Three different diplopod species were incubated with litter marked by <sup>15</sup>N enrichment in integrated microcosms along with microfauna/-flora only and soil only control. Leachate water was collected continuously and pooled after six weeks when replicates were terminated by destructive sampling. Terminal C, N and <sup>15</sup>N contents were measured in water and animals, and initial values also for litter and soil. Litter was analysed additionally for polyphenol content.

Mass loss and nitrogen release from litter showed clear patterns of dependency upon polyphenol and nitrogen content and were significantly higher under influence of the animals in good and medium quality species. Accumulation of C in soil differed from these patterns. There were marked differences in the influence of each diplopod species per gram bodyweight; for example, a smaller species mediated more than twice the increase in litter weight loss. Animal species showed clear differences in response to litter quality. Management implications and consequences for the importance of soil faunal ecology for nutrient release from litter are discussed. The developed microcosm method is considered a promising approach to study soil nutrient pathways and faunal effects.

**Keywords:** Amazonia, decomposition, diplopods, litter quality, Nitrogen, nitrogen tracer, nutrient flow, soil fauna, terra firme