

## Tagungsnummer

P64

## Thema

Kommission III: Bodenbiologie und Bodenökologie

Bodenorganismen-Pflanzen Interaktionen

## Autoren

S. Lama<sup>1</sup>, T. Kuhn<sup>2</sup>, M. F. Lehmann<sup>2</sup>, Y. Oelmann<sup>3</sup>, W. Wilcke<sup>1</sup>

<sup>1</sup>Institute of Geography and Geoecology, Karlsruhe Institute of Technology, Karlsruhe; <sup>2</sup>Biogeochemistry, University of Basel, Basel; <sup>3</sup>Geoecology, University of Tübingen, Tübingen

## Titel

<sup>15</sup>N tracing to elucidate links between biodiversity and nitrogen cycling in a grassland experiment

## Abstract

Nitrogen (N) cycling is a fundamental ecosystem function of high complexity because N undergoes many transformations in soil and vegetation. The effect of biodiversity loss on ecosystem functions in general, and on N cycling in particular, was studied in several manipulative field experiments. To generate a comprehensive view of the influence of species richness on all major N transformations, we conducted laboratory incubations, in which we added <sup>15</sup>N-labeled ammonium and nitrate to soil samples of the "Jena Experiment", a manipulative large scale, long-term biodiversity experiment in grassland. The experimental site is located in Jena, Germany. The design consists of 4 blocks and 82 plots with 1-60 species and 1-4 functional groups (grasses, legumes, small herbs, tall herbs). Approx. 400 g of field-fresh soil was sampled from each plot of one of the 4 blocks and divided into three aliquots of 100 g each. In order to trace N turnover, we amended the incubations (in triplicate) either with <sup>15</sup>N-labelled (98 at%) ammonium, nitrate, or with a mixture of both. The samples were incubated for two months at 20°C. Soil solution was extracted 1, 2, 4, 9 and 16 days after <sup>15</sup>N application by percolating 100 mL of nutrient solution through each vessel. Concentrations of NH<sub>4</sub>-N, NO<sub>3</sub>-N and total N in the extracts were determined with colorimetric methods. The N-isotopic composition in nitrate was analyzed by isotope ratio mass spectrometry (IRMS) using the denitrifier method. Ammonium N isotope ratios were determined using the "hypobromite oxidation" method, in which ammonium-N is converted to nitrite followed by azide reaction to nitrous oxide and IRMS analysis. The results will be comprehensively evaluated in a quantitative context using the modelling approach of Müller et al. (2007) to determine the size of six N pools and the rates of nine N transformations. Links between N transformation rates, N-pool size and plant species richness will be verified with the help of ANOVA.

## Literatur

Christoph, M., Rütting, T., Kattge, J., Laughlin, R.J. and Stevens, R.J. 2007. Estimation of parameters in complex <sup>15</sup>N tracing models by Monte Carlo sampling. *Soil Biology & Biochemistry* 39:715-726.