

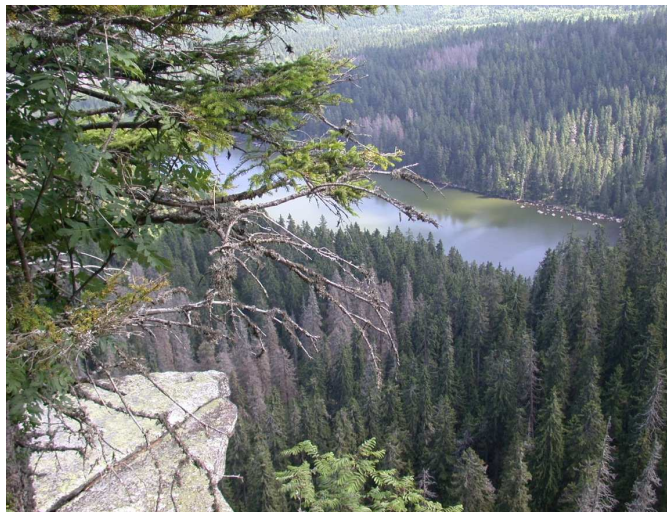
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RNDr. Thesis

Nitrogen transformations and pools in N-saturated mountain spruce forest soils

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Annotation

The size and the relative importance of the main soil N pools (microbial biomass N, NH_4^+ , NO_3^- , DON) in N saturated mountain forest soils (The Bohemian Forest, Czech Republic) were assessed. Moreover, the influence of temperature on the net processes of microbial N transformation in soil (N mineralization, nitrification, N immobilization) was determined.

Declaration [in Czech]

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Karolina Tahovská

Author's contribution

Hereby I declare that Karolina Tahovská made a significant contribution to the following article:

Šantrůčková, H., **Tahovská, K.**, Kopáček, J., 2009. Nitrogen transformations and pools in N-saturated mountain spruce forest soils. *Biology and Fertility of Soils* 45 (4), 395 – 404. (IF 2.319)

She participated in design of experiments and soil sampling, carried out all laboratory measurement, participated in data evaluation and their preparation for publication, manuscript writing, and its revision.

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Hana Šantrůčková

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Nitrogen transformations and pools in N-saturated mountain spruce forest soils

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Abstract

Nitrogen leaching persists in mountain forests of Europe even in the presence of decreasing N depositions. We have hypothesized that this leaching is linked to soil N transformations occurring over the whole year, even at 0°C temperatures. The aims were to estimate (1) the effect of temperature on N transformations and (2) N pools and fluxes. The study sites are situated in the Bohemian Forest (Czech Republic). Litter, humus, and 0–10-cm mineral layers were sampled in early spring, and the effect of temperature on net nitrification, net ammonification, and microbial N immobilization were measured in a short-term incubation experiment without substrate addition. Nitrogen pools were calculated from the concentrations of N forms in the soil and soil pool weights, while daily N fluxes were calculated from daily net rates of processes and soil pool weights. Relationships between temperature and net nitrification, net ammonification, and microbial N immobilization did not follow the Arrhenius type equation; all processes were active close to 0°C, indicating that microbial N transformations occur over the whole year. Microbial N immobilization rate was generally greater than N mineralization rate. The microbial N pool was significantly larger than mineral N pools. Organic layers containing tens of grams of available N per square meter contributed more than 70% to the available N in the soil profile. Daily N fluxes were related to N pools. On average, N fluxes represented daily mineral and microbial N pool changes of 1.14 and 1.95%, respectively. The effect of microbial composition on the C/N ratio of microbial biomass and respiration is discussed.