University of South Bohemia in České Budějovice

Faculty of Science

RNDr. Thesis

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

Mgr. Karolina Tahovská

České Budějovice 2012

Tahovská K., 2012: Nitrogen transformations and pools in N-saturated mountain spruce forest soils. RNDr. Thesis, University of South Bohemia, Faculty of Science, České Budějovice, Czech Republic, 10 pp.

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]

Prohlašuji, že svoji rigorózní práci jsem vypracovala samostatně pouze s použitím pramenů a literatury uvedených v seznamu citované literatury.

Prohlašuji, že v souladu s § 47b zákona č. 111/1998 Sb. v platném znění souhlasím se zveřejněním své rigorózní práce, v úpravě vzniklé vypuštěním vyznačených částí archivovaných Přírodovědeckou fakultou elektronickou cestou ve veřejně přístupné části databáze STAG provozované Jihočeskou univerzitou v Českých Budějovicích na jejích internetových stránkách, a to se zachováním mého autorského práva k odevzdanému textu této kvalifikační práce. Souhlasím dále s tím, aby toutéž elektronickou cestou byly v souladu s uvedeným ustanovením zákona č. 111/1998 Sb. zveřejněny posudky školitele a oponentů práce i záznam o průběhu a výsledku obhajoby kvalifikační práce. Rovněž souhlasím s porovnáním textu mé kvalifikační práce s databází kvalifikačních prací Theses.cz provozovanou Národním registrem vysokoškolských kvalifikačních prací a systémem na odhalování plagiátů.

České Budějovice ……..

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.

České Budějovice ……

Hana Šantrůčková

Financial support

This study was supported by project GACR 206/07/1200, MSM 6007665801, and CZ 0051 (01-04/05-081 IP-65 MZP).

2009, Biology and Fertility of Soils 45 (4), 395 – 404

The original publication is available at
http://www.springer.com/life+sciences/agriculture/journal/374
DOI 10.1007/s00374-008-0349-4

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

[1]Šantrůčková, H., [1]Tahovská, K., [2]Kopáček, J.

[1]Faculty of Science, Department of Ecosystem Biology, University of South Bohemia, Branišovská 31, 370 05 České Budějovice, Czech Republic
[2]Institute of Hydrobiology, Biological Centre AS CR, Na Sádkách 7, 370 05 České Budějovice, Czech Republic

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.