



The response of gross nitrogen mineralization to labile carbon inputs

Per Bengtson

Department of Biology - Microbial Ecology, Lund University, Sweden (per.bengtson@biol.lu.se)

Input of labile carbon sources to forest soils commonly result in priming, i.e. an increase in the microbial decomposition of soil organic matter. Efforts aimed at quantifying the extent of priming have, to date, largely focused on soil organic matter decomposition manifested as soil respiration. Less is known about how gross nitrogen mineralization responds to input of labile carbon.

It is often assumed that increased priming results in decreased soil carbon stocks. However, microbial mineralization of organic nitrogen into plant available forms is a major factor limiting primary production in forests. If increased decomposition of soil organic matter in response to labile carbon is accompanied by a concurrent increased nitrogen mineralization, this could result in elevated primary production and higher rates of plant derived organic matter input to soils. Therefore, in order to fully understand the effect of priming on net ecosystem exchange and soil carbon stocks, it is vital to consider if increased decomposition of soil organic matter caused by priming also results in increased nitrogen mineralization.

Here I present the results from a series of experiments aimed at determining if, and to which extent, gross nitrogen mineralization is stimulated by input of labile carbon. The results suggest that it is by no means uncommon to find an increase in gross N mineralization rates in response to labile carbon inputs. The magnitude of the increase seems dependent on the nitrogen status of the soil, as well as the concentration and rate of labile carbon inputs. However, continuous input of labile carbon sources that also contains nitrogen, e.g. amino acids, seems to inhibit rather than increase the mineralization of organic nitrogen. These findings suggest that there is a potential for a positive feedback between priming and primary production that needs to be considered in order to fully understand the influence of priming on net ecosystem exchange and soil carbon stocks.