

Relation between biodiversity of ammonia-oxidising bacteria and ecosystem processes in undisturbed and disturbed coniferous forest soils

Soil provides a particularly interesting arena to study the many phenomena related to biological complexity and ecosystem processes. One of these soil processes that show a clear relation between microbial biodiversity and process rates is nitrification. Nitrification is carried out in most ecosystems by autotrophic bacteria and is often rate limited by the activities of ammonia-oxidising bacteria (AOB) that are responsible for the oxidation of ammonia to nitrite by the enzyme ammonia monooxygenase. The diversity of AOB is suggested to influence nitrification rate.

This research consists of three parts. In the first part, the AOB diversity-nitrification rate relationship is studied in different stand ages, in disturbed and undisturbed forests. Some relevant soil characteristics such as pH, water content, organic matter, total carbon and nitrogen will be measured, to analyse if they contribute to this relationship. In addition, ¹⁵N methods will be applied to determine whether it is possible to quantify exactly the differences between gross and net NO₃ production. The second part will be focused on testing the hypothesis of a positive relation between bacterial density and ecosystem process rate. In the third part, the diversity-dependence of ecosystem properties such as nitrification rate and stability (resistance and resilience) will be tested by exposing systems to disturbances.

Duration:

Four years (March 2002-March 2006)

Participants:

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