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Nitrogen and carbon dynamics in the mycorrhizosphere of an organic forest soil

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1. Introduction

The rhizosphere is a hot-spot for biogeochemical cycles, as it shows enhanced microbial activity due to inputs of labile organic matter from rhizodeposits. *In situ* studies investigating the effects of roots and mycorrhizae on soil nitrogen (N) and carbon (C) cycling are scarce.

2. Objectives

Investigating the *in situ* gross N cycle transformations and apparent priming in a root/ectomycorrhizal exclusion experiment in an organic forest soil.

3. Materials & methods

The study was conducted in a drained organic forest soil (Histosol) at the Skogaryd research catchment, south-western Sweden. Exclosure of roots and roots plus mycrorrhiza was achieved by soil trenching, which was conducted six years prior to the experiment. We conducted *in situ* ^{15}N soil labelling using the 'virtual core approach' in order to quantify gross N transformation rates via a ^{15}N tracing model. At the same time we investigate potential rhizosphere priming by ^{13}C-glucose additions and tracing the ^{13}C into respired CO_2.

4. Results

The gross mineralization-ammonium (NH_4^+) immobilization turnover was enhanced by the presence of roots, probably due to enhanced inputs of labile carbon, stimulating microbial activity, which coincided with a positive priming effect. Autotrophic nitrification was only stimulated by presence of ECM, but not by presence of roots, which we could relate to changes in the abundance of nitrifying microorganism.

5. Conclusion

Overall we conclude that plants and their ectomycorrhizal symbionts actively control N and C cycling in forest soil.