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Mosses reduce soil N availability via their effects on soil temperature and atmospheric N sequestration

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In high-latitude ecosystems mosses (bryophytes) are important drivers of ecosystem functions. Alterations in abundance of mosses due to global change may thus strongly influence C and N cycling and hence feedback on climate. The effects of mosses on soil microbial processes are, however, still scarcely investigated. This study aims at elucidating the mechanisms, how bryophytes influence microbial decomposition processes of SOM and thus soil nutrient availability.

We present results from an experiment in an open birch forest in N-Sweden, where we removed the moss cover and simulated the thermal effects of the mosses by means of an artificial soil coverage, combined with fertilization with 15N-labelled N for investigating the effects of moss N sequestration.

Our results reveal (1) that a thick moss cover reduces soil N availability and retards soil N-cycling; (2) that this is to a large extent due to the influence of mosses on the soil thermal regime. Furthermore, our results show (3) that mosses may prevent effects of increased atmospheric N deposition on soil microbial activities by efficiently sequestering atmospheric N inputs.

In high-latitude ecosystems with continuous moss cover, such as subarctic forests, a future reduction in abundance of mosses due to climate change may thus accelerate microbial decomposition processes of SOM and increase soil N availability, irrespective of the effects of expanding vascular plants, and hence potentially feed back on climate.