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Increased N uptake from soil organic matter through priming may increase NPP of forest trees

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The response of plant photosynthesis to changing environmental factors is of crucial importance when trying to understand and quantify changes in ecosystem processes determining the carbon balance of soil. Increased atmospheric CO_2 concentration and elevated temperature are assumed to increase net primary production (NPP) in boreal forest zone. Plant photosynthesis is the main source of labile, easily utilizable carbon (C) in soil ecosystem through litter production but especially through root exudation. Input of fast-cycling C has also been shown to induce so called priming effect, i.e. the accelerated decomposition of more recalcitrant C compounds. We aimed to artificially induce the soil organic matter (SOM) decomposition by adding glucose and/or the plant (Scots pine, Pinus sylvetris) to the boreal humus containing microcosms. In another study, we investigated the influence of different ectomycorrhizal (ECM) fungal symbionts, crucial in tree nutrient uptake in boreal forests, on the C assimilation and allocation of Scots pine. We found indications on the intimate connection between tree N uptake from SOM and priming effect, induced by glucose additions. Also, the effect of different ectomycorrhizal symbionts on plant photosynthesis was not related to C sink but to N uptake, retention and allocation. To summarize, we conclude that since increased NPP will most probably increase easily utilizable C in soil, the decomposition of recalcitrant SOM will increase if N availability is limited. In case of increased SOM decomposition, N uptake of trees will be improved through ECM fungal symbionts and this may result in increased NPP.