Geophysical Research Abstracts
Vol. 16, EGU2014-2062, 2014
EGU General Assembly 2014

Nitrogen leaching, and nitrogen retention capacity by ectomycorrhizal fungi, in a Norway spruce forest fertilized with nitrogen and phosphorus

Håkan Wallander (1), Adam Bahr (1), Magnus Ellström (1), and Johan Bergh (2)

(1) Departmen of Biology, Lund University, Sweden, (2) Southern Swedish Forest Research Centre, Swedish University of Agricultural Sciences

Ectomycorrhizal (EM) fungi enhance the uptake of nitrogen (N) in boreal forests and get carbohydrates from the trees in exchange. The external mycelium of these fungi explores the soil efficiently and forms a network with a high capacity for N retention. However, when the availability of inorganic N increase the growth of EM mycelia decline, which enhance the risk of N leaching. In the present study we analyzed how fertilization, with N as well as N in combination with phosphorus, affected EM fungal growth and N leaching in a Norway spruce forest in southern Sweden. Additionally, we added 15N labelled NH4+ to mesh bags colonized by EM mycelia to analyze if the amounts taken up by mycelia and the amount that leached through were affected by N fertilization. We found that EM growth declined after N addition and even more so when N was combined with P addition. Nitrogen leaching peaked shortly after fertilization and declined continuously over the experimental period (16 months). Contrary to our expectations, no increase in N leaching occurred during winter and early spring when EM growth was at minimum. We found a large N assimilation capacity of EM mycelium in the mesh bags (0.31 mg 15N g-1 EMF mycelium day-1, SE = 0.03) with no difference between control and fertilized stands. However, a much larger proportion of the recovered 15N (90%) leached through the mycelium in N fertilized forests compared to control stands (50 %), probably due to less abundant EM mycelia. The importance of EM mycelia for N retention in boreal and boreo-nemoral forests will be discussed.