



The effect of increased air humidity on fine root and rhizome biomass and turnover of silver birch forest ecosystem - a FAHM study.

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A facility for free air humidity manipulation (FAHM) was established to investigate the effect of increased air humidity on belowground biomass and turnover in silver birch (*Betula pendula* Roth.) forest ecosystems with respect to rising air humidity predicted for Northern Europe. Fine root and rhizomes are short-lived and recognized as the most important component contributing to below-ground C fluxes in forests. The FAHM system enables air relative humidity to be increased on average 7 units (%) over the ambient level during mist fumigation.

The experimental site contains humidified (H) and control (C) plots; each plot contains sectors with diverse “forest” understory and early successional grasses. The trees were planted in 2006, humidification started in spring 2008, and soil cores to study fine root and rhizome biomass and turnover were taken in 2007, 2009 and 2010.

In July 2009, total fine root and rhizome biomass was 8 tons per ha in C and 16 tons per ha in H plots. The roots of understory formed 86% in C and 93% in H plots, respectively. Our preliminary data suggest that the increased humidity affected more the roots of understory plants: fine root and rhizome biomass and production increased approximately twice by increasing air humidity. However, the tendency was similar for fine root biomass and production of silver birch. Fine root turnover speeded up for both silver birch and understory roots in H plots. Hence, changes in air humidity can significantly affect forest carbon cycling.