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Vitality and turnover rates of tree fine roots affected by competition and drought

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Roots and their turnover play a vital role for individual plant growth, the interaction and competition between different tree species and the carbon and nutrient cycle in the soil. However the dynamics of fine root turnover are not fully understood. Our project analyses the interactions of beech *(Fagus sylvatica* L.) and ash *(Fraxinus excelsior* L.) in the rhizosphere. In particular the relation between longevity, branching order and nutrient availability of fine roots will be explored. The poster will present the methods used in the project and preliminary results.

Methods include a container experiment with beech and ash. By using the minirhizotron technique, we monitor the roots over selected time intervals. Thereby the longevity and mortality of fine roots can be viewed and compared through image analysing. The above-and belowground biomass production will be determined annually. In an additional microcosm experiment with an integrated split root system we will trace the C- and N-allocation and partitioning with stable isotopes marked leaf litter. Small rhizoboxes serve as a tool to implement competition and manipulation experiments. Biochemical tests in comparison to morphological analyses are applied to investigate root vitality and turnover. Thus the allometric relationship between fine root diameter, branching order and metabolic activity is investigated. Another drought and nitrogen experiment is established in the Gottingen Rhizolab. The rhizolab is an outdoor laboratory with eight containers of 8 m3 volume each covered with a mobile roof, which excludes rainfall. Minirhizotrone tubes are installed horizontally in several heights. The 3 year old trees are supplied with different water and nitrogen concentrations.

The outcomes of the project will help to understand the dynamics of root turnover, the parameters affecting the lifespan of roots and the complexity of the rhizosphere dynamics.

Keywords: fine roots, turnover rates, minirhizotron, rhizobox, split root system, drought