10th FEFCO

Forest Ecosystem Function Colloquium (FEFCO) は、地域や地球全体のレベルで森林生態系の機能とその持続的活用法を統合的に理解することを目的とし、研究者間の学術交流を推進します。

第10回森林生態系機能コロキウムは、名古屋大学で開催される第6回国際樹木根会議のため来日される、Dr. Ivano Brunner (スイス・WSL)とDr. Ivika Ostonen(エストニア・タルツ大学)の両氏に講演いただきます。スタッフ・学生問わず、どうぞ奮ってご参加ください。京都大学農学研究科森林利用学分野がホストを務め、名古屋大学大学院学環境研究科の平野恭弘氏との共催で行われます。

10th FEFCO
2014/9/17 16:00 - 17:30
Faculty of Agriculture Main Building, S174
Dr. Ivano Brunner （WSL）
Dr. Ivika Ostonen (University of Tartu)

(1) 10 years of irrigation of a *Pinus sylvestris* forest in a climatic dry area in Switzerland

Scots pines (*Pinus sylvestris*) in the inner-Alpine dry valleys of Switzerland have suffered during the past decades from increased mortality, which has been caused by longer and more frequent dry periods. In addition, an ongoing replacement of Scots pines by pubescent oaks (*Quercus pubescens*) has been observed. In 2003, an irrigation experiment was started to track changes by reducing drought pressure on the natural pine forest. After a decade of irrigation, we observed major adaptations in the vegetation, and shifts in the fungal and microbial communities, and alterations in the soil and the Scots pine fine roots. Irrigation permitted new plant species to assemble and promote canopy closure with a subsequent loss of herb coverage. Fine root dry weight increased under irrigation and fine roots had a tendency to elongate. Structural composition of fine roots remained unaffected by irrigation, expressing preserved proportions of cellulose, lignin and phenolic substances. A shift to a more negative d^{13}C signal in the fine root C indicates an increased photosynthetic activity in irrigated pine trees. Using radiocarbon (^{14}C) measurement, a reduced mean age of the fine roots in irrigated plots was recorded.

(2) The effect of increased air humidity on northern deciduous forest ecosystem - a FAHM study

At northern latitudes a rise in atmospheric humidity and precipitation is predicted as a consequence of lobal climate change. In 2006 an unique experimental facility for free air humidity manipulation (FAHM) was established in Estonia to study the functioning of deciduous forest ecosystem under altered humidity conditions. The experimental site contains humidified and control plots, each includes four types of forest ecosystem: two overstorey species (planted hybrid aspen (Populus tremula L. × P. tremuloides Michx. and silver birch (Betula pendula Roth.)) both split into two types according to understorey vegetation (diverse “forest” understory and early successional grasses). We investigated the productivity, biomass allocation and functioning of both forest ecosystem in response to elevated atmospheric humidity (on average 7% over the ambient level) during four growing seasons (2008–2011). We hypothesized that elevated air humidity facilitates both above- and below-ground growth and accumulation of plant biomass. During the first three experimental seasons height, stem diameter, and stem volume (D2H) increments of trees, biomass of understory in aboveground and fine root biomass in belowground were similar or significantly reduced in humidified plots. Only the fine root and rhizome biomass of the understory was twice higher in humidified plots. However, fine root turnover speeded up for both tree and understory roots. The trends in above-ground growth changed in 2011, when current annual increments of trees height, diameter, stem volume and fine root biomass were higher in humidified plots. Functionally, trees hydraulic conductance was significantly higher and stem sap flux lower for humidified trees coinciding with significantly higher biomass of primary (in majority ectomycorrhizal) roots, morphologically thinner and longer root tips and higher specific root length. Humidification caused a shift in the root tips colonizing fungal community towards the dominance of hydrophilic taxa. Different structural and functional aspects of forest ecosystem acclimation to increasing atmospheric humidity in boreo-nemoral deciduous forests will be discussed.

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