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Effects of Global Warming on Root Growth, Nutrient and Water Flow in an Oak Model Ecosystem

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IPCC scenarios predict a global mean annual temperature increase during the 21st century of approximately 2 – 6 °C, as well as a different precipitation pattern compared to the last decades (IPCC 2007). The effects and the importance of global warming will strongly differ between regions according to their latitude, topography or elevation. In Middle Europe (Switzerland), for example, mean temperature has increased since 1970 approximately 1.5 °C, which is about 1.5 times more than in the rest of the northern hemisphere (IPCC 2007, OcCC 2008). Until 2050, temperature in Switzerland will increase for another 1.8 °C in winter and 2.7 °C in summer respectively. The amount of precipitation in 2050 compared to now will increase about 8% in winter and decrease approximately 17% in summer (FREI et al. 2004). Therefore, dry and hot summers like 2003 in Middle Europe will be quite usual (SCHÄR et al. 2004).

How will global warming affect the trees in Middle Europe? Oak species are known to be tolerant of warmer temperatures and drought periods. They are therefore foreseen for future silviculture in Europe. However, knowledge of the specific reactions of the three most important oak species of Switzerland (*Quercus robur, Q. pubescens* and *Q. petrea*) to global warming and drought alone or in combination is largely missing. To know the reactions of the different species (or provenance) to a future climate will be necessary not only for science but also for forestry management.

The WSL lysimeter experiment "Querco" will help to address this issue for answering how the expected climate change will influence young trees of three different oak species growing together in large chambered lysimeters on two different forest soils. The present PhD thesis focuses on effects of increased air temperature and droughts on soil water and nutrient regime as well as root growth.

Literature

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