Air Pollution and Climate Change at Contrasting Altitude and Latitude

23rd IUFRO Conference for Specialists in Air Pollution and Climate Change Effects on Forest Ecosystems

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Abstracts

WSL Swiss Federal Institute for Forest, Snow and Landscape Research

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Gene expression and ecophysiological analyses of different *Fagus sylvatica* genotypes under high levels of CO2

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The problems related to climate change, mainly caused by human activities, are the origin of much concern for the health of the environment. Oil and carbon combustion, the use of chlorofluorocarbons, and deforestation are some of the principal factors responsible for an increase in CO2 and air temperature. This scenario could determine climate change affecting precipitation patterns, nitrogen concentration in the atmosphere, increase in UV-B radiation, and temperature range (Thuiller et al., 2005). Forest trees constitute of a relevant economic and ecological resource that is under severely threaten by environmental changes.

The principal aim of this study is to investigate the response to CO2 from two different *Fagus sylvatica* by gene expression and ecophysiology analyses. Shoots of *F. sylvatica* (Montieri (GR), Italy) and *F. syledvatica* "purpurea tree" were grafted on *F. sylvatica* rootstocks. Plants were grown under controlled conditions in a climate chamber using the same temperature and light parameters, while CO2 concentrations were approx. 380–400 ppm (ambient) in the control room and 1000 ppm (high) in the experimental room.

A PAM fluorescence system (PAM-2000, Heinz Walz GmbH, Effeltrich, Germany) with a 6 mm diameter standard fibre optic was used for the measurements of the *in-vivo* photosynthesis. Under ambient conditions photosynthesis (expressed as electron transport rate ETR) was higher in the Italian than in German genotype. After 4 days under elevated CO2, the electron transport rate showed increased values compared to the plants growing under ambient CO2. Photosynthesis of plants (Italy) adapted to high CO2 decreased immediately after being exposured to ambient CO2 for 2 hours. No down-regulation of photosynthesis could be observed in leaves at high CO2 level. Preliminary microarrays analyses have been done and results will be discussed.

Reference:
Thuiller, W., Lavorel, S., Araújo, M.B., Sykes, M., Prentice, C.I., 2005. Climate change threats to plant diversity in Europe. PNAS 102, 8245-8250.

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