GMOX

Réponse de la conductance mésophylienne au stress oxidant/Mesophyll conductance response to oxidative stress

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Context — Intensity and frequency of abiotic stress episodes are expected to increase in the future, potentially limiting photosynthesis and woody resource production. It therefore is essential to understand, in detail, mechanisms allowing plants to cope with stresses and maintain high photosynthetic capacity. Carbon uptake in C3 plants is mainly determined by biochemical (Rubisco enzyme) and CO_2 diffusion limitations: stomatal (g_s) and mesophyll conductances (g_m). The latter is suggested to usually account for 20 to 50% of photosynthetic limitation, but may rise up to 75% in most severe conditions (Galmes *et al.* 2007). Finding possibilities for improving g_m is therefore essential to increase photosynthetic productivity. Several environmental constraints that lower g_m (water stress, increasing VPD, elevated O3, salinity or decreasing temperature) also induce oxidative stress and reactive oxygen species (ROS) production. However, there is currently limited mechanistic understanding of the response of g_m to oxidative stress.

Objectives — The GmOX project aims at deciphering g_m regulation in poplar exposed to oxidative stress and determining the relative contribution of g_m determinants in this response.

Approaches — Several euramerican poplar genotypes will be tested for their g_m response to oxidative stress. Ozone will be used to induce oxidative stress in leaves. Contrasted genotypes will then be studied to decipher main determinants of g_m regulation. An integrative approach is proposed to reach the main objective using a combination of methods from molecular to leaf level.

Expected results and impacts — This project is expected to improve knowledge on one of the main limiting factor of carbon fixation. The integrative approach should allow to decipher mechanistic regulation of gm in response to stress and therefore, uncovering the limitations of photosynthesis that control plant productivity.