

Full greenhouse gas balance of a bio-energy plantation (POPFULL)

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The ecosystem scale research project we just started in Flanders (Belgium; POPFULL) will provide a full accounting of the greenhouse gas balance of a 19 ha short rotation coppice (SRC) plantation of fast-growing poplar and willow. The ultimate goal is to examine the potential of SRC cultures to reduce atmospheric CO₂ concentrations in Europe –through fossil fuel substitution – and to mitigate climate change.

As atmospheric CO₂ concentrations will inevitably increase further from 370 ppm at present to values between 490 ppm (best case scenario) and 1260 ppm (worst case scenario) at the end of this century (IPCC, 2007), we test the potential of SRC plantations to sequester CO₂ from the atmosphere and also investigate the emission/uptake of the other most important greenhouse gases (H₂O, CH₄, N₂O) from the plantation and their environmental controls. We will measure the different greenhouse gases exchange of this high-density SRC culture will be monitored for four years using eddy covariance techniques. This would represent the first project in which all these greenhouse gases are investigated at the same time in a SRC coppice plantation. Moreover, as poplar is a sensitive species to O₃, a strong pollutant in many European areas, we also investigate the effect of ozone damage to CO₂ uptake and on the net exchange of H₂O, CH₄, and N₂O from the SRC plantation.

Within the framework of the POPFULL project we are also quantifying the complete energy balance and the full economic balance in line with a full life cycle assessment. This research receives funding from the European Research Council under the European Community's Seventh Framework Program (FP7/2007-2013), ERC grant agreement nr. 233366 (POPFULL).