

POPFULL

Full greenhouse gas balance of a bio-energy plantation

D. Zona¹, J. Cools¹, A. Zaldei², and R. Ceulemans¹

¹Department of Biology, Research Group of Plant and Vegetation Ecology, University of Antwerp, Belgium

²National Research Council (CNR), Biometeorology Institute, Firenze, Italy



➤ The research project we just started in Flanders (Belgium; POPFULL) will provide a full accounting of the greenhouse gas balance and energy production of a 18.4 ha short rotation coppice (SRC) plantation of fast-growing poplar and willow.

➤ The goal of this project is to 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, O₃) from the plantation and their environmental controls.



Fig. 1 Eddy covariance tower (left) in the experimental plantation in September 2010.

We installed a meteorological and eddy flux tower in March-April 2010 and are currently measuring:

➤ A complete suite of environmental variables (water table, soil moisture, soil and air temperature, solar and thermal radiation, diffuse radiation, soil heat flux, etc.)

➤ CO₂, H₂O, CH₄, N₂O, and O₃ fluxes from the plantation with eddy covariance

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.

Below are shown some of the preliminary results from the first season. The fluxes are dominated by CO₂ and N₂O (CO₂ sink and a N₂O source). The CH₄ fluxes show very low values (data not shown), probably for the sandy soil usually dry on the surface. The emission of N₂O follows the drop in water table (Fig. 2). When the soil dries out further the plantation presents a N₂O sink. The plantation is also a sink for O₃ (Fig. 3).

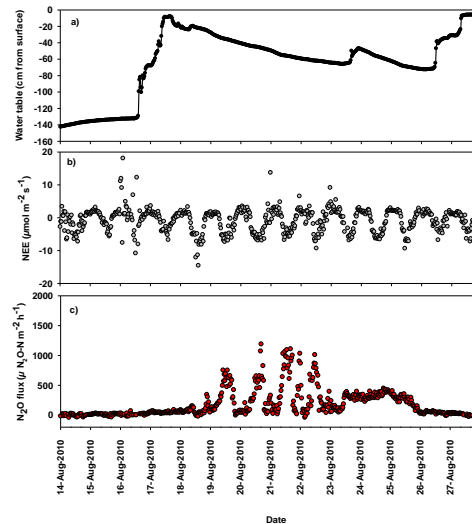


Fig. 2 Water table (a), NEE (b), and N₂O fluxes (c) for the plantation during part of the month of August 2010. Notice the increase in N₂O emission after water table drop on the 19 to the 26 of August.

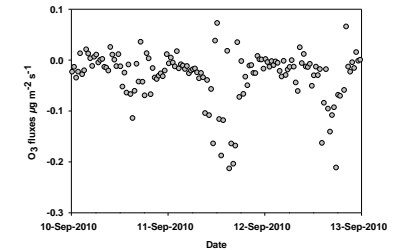


Fig. 3 O₃ fluxes from the plantation on 10-13 September 2010

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