The POPFULL research project started in Flanders (Belgium) is testing the potential of SRC plantations to sequester CO\textsubscript{2} from the atmosphere and investigate the emission/uptake of the most important GHG (H\textsubscript{2}O, CH\textsubscript{4}, N\textsubscript{2}O, O\textsubscript{3}) and their environmental controls.

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

- Environmental variables (water table, soil moisture, soil and air temperature, solar and thermal radiation, diffuse radiation, soil heat flux, etc.)
- CO\textsubscript{2}, H\textsubscript{2}O, CH\textsubscript{4}, N\textsubscript{2}O, and O\textsubscript{3} 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 accounting in line with a full life cycle assessment.

In Fig. 2 are shown data from the first field season (2010) when an intense precipitation event (~80 mm rainfall in 48 hours) occurred after a prolonged fairly dry summer period.

This first extreme precipitation caused:

- peak N\textsubscript{2}O emissions (up to 2,200 µg N\textsubscript{2}O-N m\textsuperscript{-2} h\textsuperscript{-1})
- CO\textsubscript{2} (NEE) and CH\textsubscript{4} fluxes did not respond to any of these rain events

This was probably caused by the N availability to microorganisms that exceeded C availability at our site.

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

Fig. 2 Water table, N\textsubscript{2}O fluxes (µg N\textsubscript{2}O-N m\textsuperscript{-2} h\textsuperscript{-1}), CO\textsubscript{2} fluxes (NEE, mg CO\textsubscript{2} m\textsuperscript{-2} s\textsuperscript{-1}), and CH\textsubscript{4} fluxes (mg CH\textsubscript{4} m\textsuperscript{-2} s\textsuperscript{-1}) in the plantation during part of the month of Jun-December 2010. Notice the increase in N\textsubscript{2}O emission after water table drop on the 19 to the 26 of August.

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