The impact of harvest on the spatio-temporal variability in soil GHG fluxes in a short-rotation poplar plantation (POPFULL)

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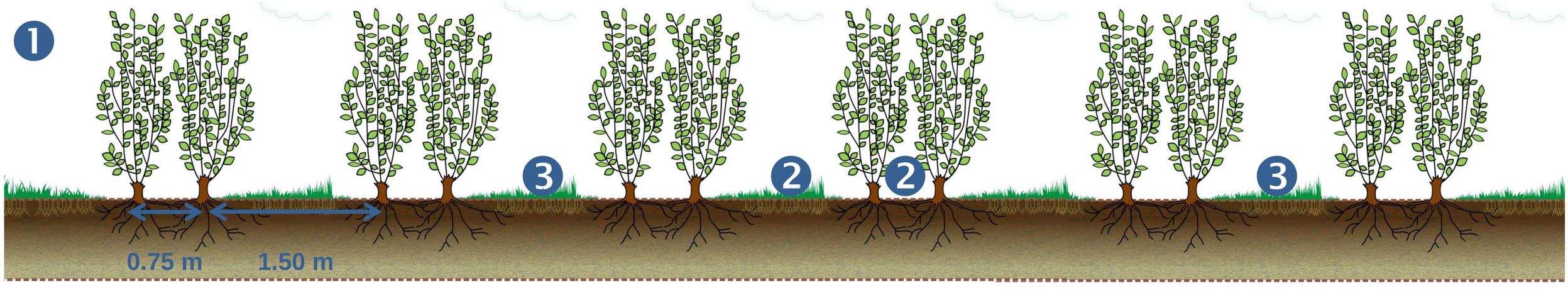
Background

- Bioenergy crops can release substantial amounts of soil GHG depending on crop type and management intensity.
- The present knowledge about soil GHG fluxes from bioenergy crops is not sufficient to accurately quantify them, but quantitative data is urgently needed for decision making.
- This is especially true for woody crops like poplar which might become more important in the future because of their relatively high GHG mitigation potential.

Objectives

- Simultaneous quantification of the changes in soil gas concentration profiles and soil fluxes of CO_2, CH_4, and N_2O caused by a harvest event in a 4 yr. old poplar bioenergy plantation.
- Studying the influence of the spatial factors 'former land-use type' and 'inter-row spacing' on these changes.
- Identification of underlying interactions between soil carbon and nitrogen dynamics driving these influences.



Study site and methods

- 4 yr. old poplar bioenergy plantation with double-row planting system located in Lochristi (Belgium)
- 1st harvest in February 2012, 2nd (targeted) harvest in February 2014
- 4 experimental blocks spaced about 10 m apart (❶ shows an example of a block setup)
- 2 blocks are located on former pasture, 2 on former cropland

Soil gas samplers at 5, 15 and 50 cm depth (❷).

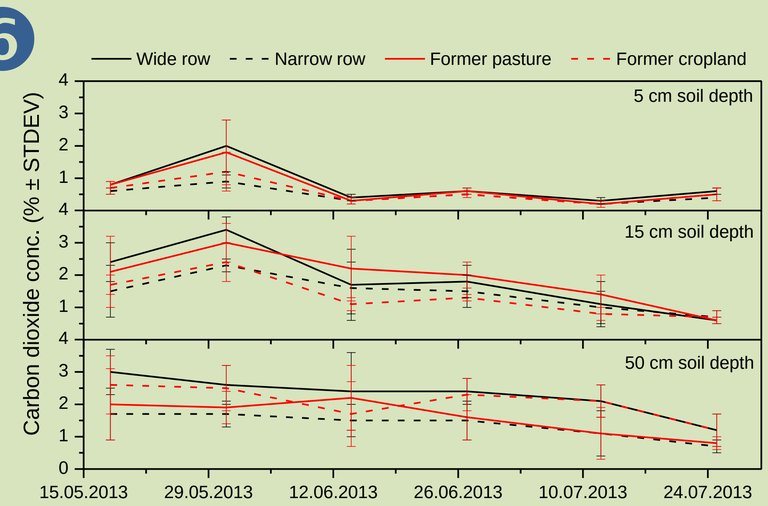
Automated chamber (❸; UIT GmbH, Dresden, GER).

Gas analyzers (Los Gatos Research, USA).

First results

- Diurnal variability in ambient CH_4 concentration, but no fluxes detected with chambers (❹).
- Low nitrogen content in groundwater (NO_2^- < 0.01 mg l^{-1}, NO_3^- < 0.1 mg l^{-1}, other nitrogen < 2 mg l^{-1}), but N_2O fluxes still observable (❹).
- Former land-use type affects root biomass (❺).
- Former land-use type as well as inter-row spacing seem to affect soil CO_2 and O_2 concentrations (❻ and ❼).

❻



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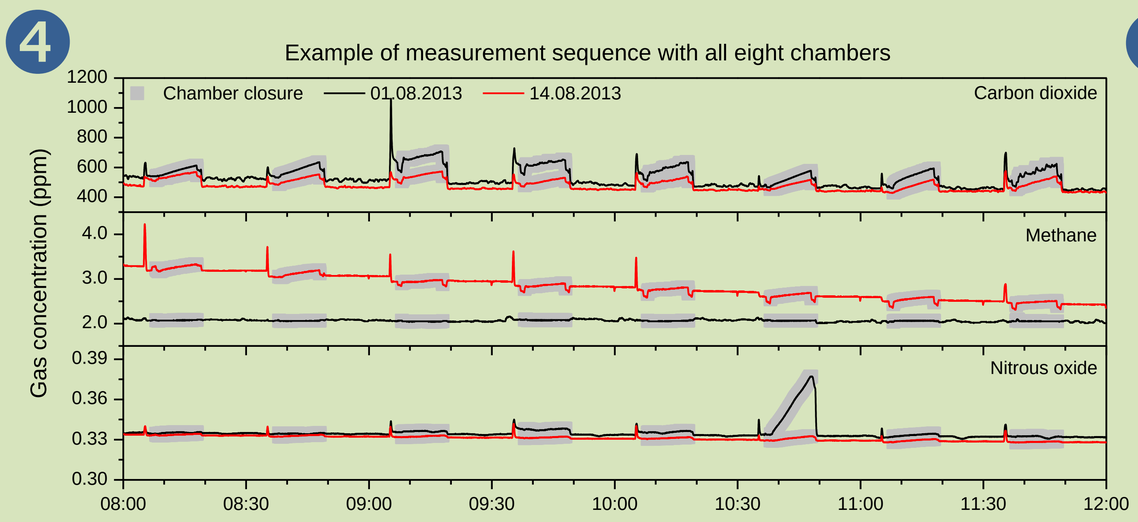

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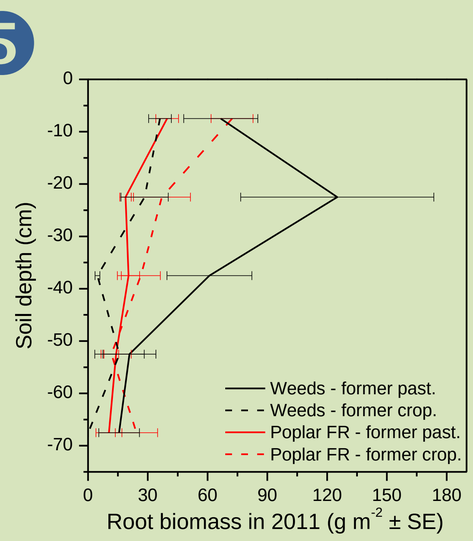

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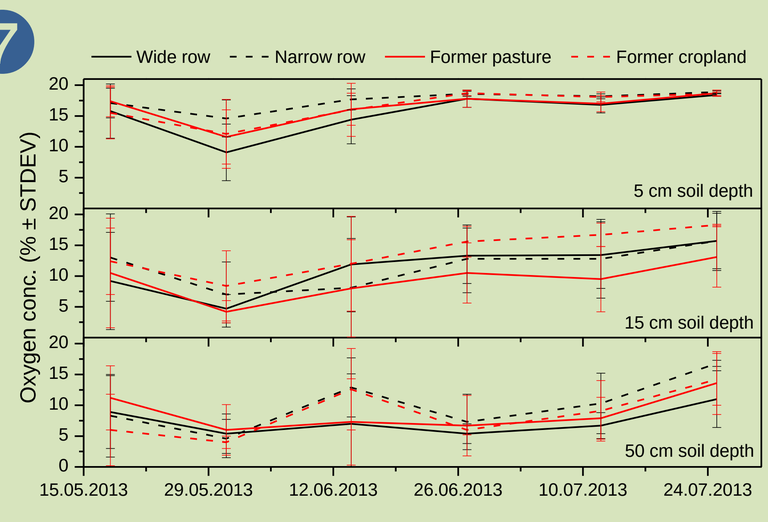

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