

1- « SOLRESIDUS » Project

Cultivation practices are known to induce a modification of soil organic matter quantity, quality and spatial distribution, which may impact dry matter decomposition kinetics.

In order to bring answers to these questions, a multidisciplinary

project was set up by the University of Liege, Gembloux Agro-Bio Tech in collaboration with Walloon Agricultural Research Centre (CRA-W).

The aim was to investigate the impact of cultivation practices (tillage and residue restitution) on crop growth, yield and environment, as well as on soil properties and on activities

2- Site description

- Located in Gembloux
- The experimental design is a latin square 4X4. (16 plots :15*40m)
- We study:

✓ Tillage operations :

- 2 stubble breaking (depth: 10 cm) + Plough (depth: 25 cm) + rotary harrow + sowing
- 2 stubble breaking (depth: 10 cm) + rotary harrow + sowing



✓ Crops residues management:

- Exportation
- Restitution

3- Soil respiration measurements

- ✓ in cropping zone (total respiration)
- ✓ in root exclusion zones created (heterotrophic respiration)

• Automatic soil chambers

- 16 homemade chambers, closed dynamic chamber type.
- Implanted on 2 ploughed plots to compare residue impacts.
- One cycle per hour



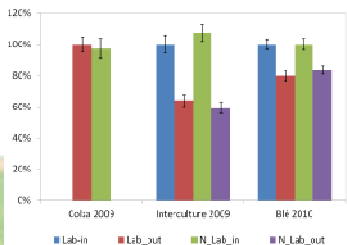
• Manual soil chambers

- 4 repetition per plots (on 16 plots)
- Frequency : once per week for the two types of respiration
- The device : Li-Cor 6400 equipped with LiCor 6400-09 soil chamber put on a fixed collar.

4- First results

After 3 years, we observed:

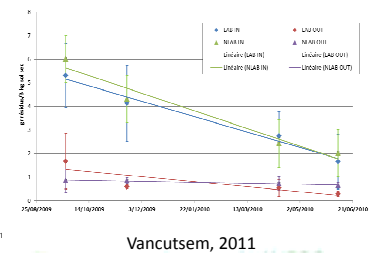
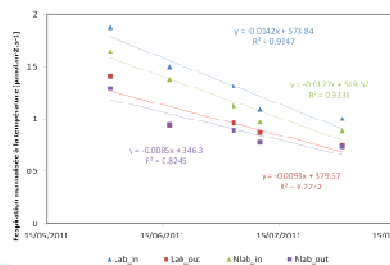
a) no significant differences in soil respiration between tillage modalities after 3 growing seasons.



b) a significantly higher flux in plots with residue restitution

→ explained by the larger amount of organic carbon prone to decomposition

c) a decrease of standardized heterotrophic respiration (linked with residue decomposition) during growing seasons



d) Difference between intercrops

→ Explained by difference of residues quality (between winter wheat and rape oil)

	IC 2009		IC 2010		IC 2011	
	Rape oil	Winter wheat	in	out	in	out
Fluxes	2.19	1.33	1.75	1.54	1.98	1.77
difference	39%		12%		11%	
Temperature	17°C		12.5°C		16.5°C	
Residues						
Quantity [t.ha ⁻¹]	5.90±0.59	1.12±0.10	8.50±0.74	7.04±1.12	6.44±1.09	3.75±0.83
difference	47%		17%		42% (ou 49%)	

The experiment is still in progress, more years being necessary in order to evaluate the long-term impacts of cultivation practices on soil respiration.