RESIDUES MANAGEMENT IN SILTY SOIL: FIRST ASSESSMENT ON CROP PRODUCTION

Marie-Pierre HIEL 1, 3 – Claire OLIVIER 2 – Jérôme PIERREUX 1 – Marie CHELIN 1 – Christian ROISIN 2 – Bernard BODSON 3

1 AgricultureIsLife, Gembloux Agro-Bio Tech, University of Liège, Belgium; marie-pierre.hiel@ulg.ac.be; 2 Department of Soil Fertility and Water Protection, Wallon Agricultural Research Center; 3 Department of Agronomical Sciences, Gembloux Agro-Bio Tech, University of Liège

CONTEXT & OBJECTIVES

Crop residues = source of organic matter

Maintain soil fertility

Export for external uses

The aim of our project is to understand all major processes involved in residues management in the soil-water-plant systems in loamy soil and temperate climate.

In this context we focus on crop production after two years of experimentation (Winter wheat in 2011 and 2012).

Results

Weather Conditions

Highly contrasted climatic conditions:

2011: unusually dry from February to May

2012: globally beneficial for crop production

Crop Germination

In 2011 and 2012:

Influence of conventional tillage (CT)

Influence of residue retention (IN)

Weeds

In 2011 with poor germination conditions → Rapeseed highly present in CT-IN by a stimulation of seed buried from rapeseed crop in 2009

In 2012 with favorable germination conditions → no effect on weeds occurrence

Plant Diseases & Pests

No residue management effect were observed on the occurrence of plant diseases or pests.

Crop Development & Yield

2011

Effect of drought:

- on crop development whatever treatment

- on mineralization according to Fierer (2003)

After drought:

Biomass accumulation is lower in IN treatments → presumably due to stronger microbial activity (Dufranne, 2011) and subsequent competition for nitrogen resources.

Yields:

Lower in RT condition

Could be explained by:

→ a delay in vegetation growth

→ a delay in nitrogen uptake by plant after 3rd nitrogen application.

2012

Weather conditions for wheat growth.

→ Attenuation of differences observed in germination rate.

Yields:

No effect of residue management

Materials & methods

A long term field experiment is settled in a loamy soil in Belgium since 2009. Four treatments are tested in relation to the quantity and vertical distribution of crop residues.

Crop rotation is the following: rapeseed, winter wheat, winter wheat (2011), winter wheat (2012), faba bean, winter wheat. On each plot, measurements are performed on crop development, weeds and diseases occurrence.

Crop residues

IN: retention of all crop residues

OUT: exportation of straw

TILLAGE

CT: conventional tillage by moldboard plow at 25 cm depth

RT: reduced tillage by shallow tillage at 10 cm depth

REFERENCES


AgricultureIsLife.be