

## PHENWHEAT: A PROJECT WITH LESSONS TO TEACH US ABOUT PHENOTYPING

**September saw the CRA-W bring the Phenwheat project to a close in style with a doctoral defence and a seminar dedicated to phenotyping.**

Phenotyping is a key step in the process of selecting varieties, and involves measuring the observable characteristics of an organism in order to understand the interaction between its genes (genotype) and its environment. Phenotyping requires a number of observations in the field in a wide range of different environments. To do this, imaging sensors are used to support breeders, in order to automate data acquisition and increase the flow of observations. Within this context, the CRA-W participated in the **PhenWheat project**, in order to test near-infrared hyperspectral imaging as a means of assessing Fusarium infection in winter wheat. This topic was the subject of a doctoral thesis by Damien Vincke.

This project has developed a laboratory method for detecting Fusarium rot on ears collected in the field, and two field methods

for detecting ears that have been infected with Fusarium directly in the field. The results obtained in the laboratory indicate that it is possible to differentiate between ears that are healthy and ears that have been infected with Fusarium, and to assess the severity of the infection in the ear based on three levels of severity (healthy ears, ears with a low-to-moderate level of infection and heavily infected ears). The results obtained in the field show that near-infrared hyperspectral imaging makes it possible to evaluate the general health of the ears. However, current developments in these methods do not allow us to differentiate between a Fusarium infection and another fungal infection (take-all). Future developments in these methods will examine the possibility of distinguishing between different types of stress on the ear as part of the **Phenet project**.



These phenotyping activities, as well as phenotyping activities conducted by various institutions in Wallonia, France and Switzerland, were presented during the 'Contributions of spectroscopy and imaging to the phenotyping of plant productions' seminar, which was held in Gembloux on 10 September. This seminar allowed for great exchanges, and will undoubtedly lead to new collaborations around the theme of crop phenotyping.

*Platform mounted on a tractor for hyperspectral imaging by the CRA-W*

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## HOW ARE AGRO-ECOLOGICAL MULTI-CROP/LIVESTOCK SYSTEMS PERFORMING IN THE CENTRAL ARDENNES REGION?

**Since August 2022, the SPoT project has been exploring the relevance of multi-crop/livestock systems as a means of responding to local and global challenges, with a focus on climate adaptation, reducing environmental impacts, food production for human consumption and circular sustainability.**

### A trial based on innovative agro-ecological practices

In order to study this, a long-term trial is being set up for organic production in Libramont, with the aim of testing three levels of articulation between crops and livestock. This translates to a 0%, 30% or 70% proportion of permanent meadow in the plot. Ruminants stem from a terminal cross-breeding, and are bred and fattened in systems with 30% and 70% meadows, based on products that come from the meadows themselves and by-products/residues from the crop system. In the crop system, a crop rotation has been defined to maximise the production of food for human consumption. Agro-ecological levers have been implemented (intercropping, less work on the soil, mobilisation of animals that are capable of valorising coarse fodder, varietal choices, etc.) to minimise the use of inputs in particular.

### What can we expect?

An initial estimate of expected performances was calculated using, in particular, the DECIDE tool. It appears that, excluding the storage and destocking of carbon in soils, greenhouse-gas emissions would be 3 kilos to 50 kilos of CO<sub>2</sub> equivalents per kilo of protein produced, depending on the system in question. Currently, however, for a standard suckling system, it is estimated that greenhouse-gas emissions are greater than 100 kilos of CO<sub>2</sub> equivalents per kilo of protein produced.

This assessment serves as a guide. However, it must be tested against the situation on the ground, which could prove to be different (difficulties in planting, or even downgrading of, crops, etc.). Thanks to the trials that have been set in motion, we will know much more about the real-world performance and

resilience of the various systems in a few years, as well as the appeal of the benefits made possible by arranging livestock and crop set-ups in these ways.

### A little more

The trial that has been established also aims to assist in the transition towards more sustainable systems. It makes it possible to test innovative agricultural practices, and encourages reflection on the obstacles facing the transition to multi-performance systems.

**More information:**  
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