No. 83
WINTER
2024-2025

CRA-W
INFO

Wallonie recherche CRA-W

VALCERWAL: HOW TO IMPROVE THE VALORISATION OF CEREALS FROM WALLONIA?

MOVING TOWARDS A GREATER USE OF WALLOON CEREALS, BY HELPING THEM TO BETTER SATISFY THE EXPECTATIONS OF LOCAL FOOD PROCESSORS.

Contact: Bruno Godin · b.godin@cra.wallonie.be

During each harvest season, a portion of grains cannot be used for food purposes, for technological or sanitary reasons. The **ValCerWal project** is developing solutions to prevent these issues, in order to facilitate the success of Walloon cereals in food production. The project is primarily focused on the aptitude of wheat and spelt to produce bread. It also looks at assessing the quality of brewing barley and durum wheat. This project is developing three approaches to limit technological or sanitary issues:

1) **Optimising the tools used to sort cereals** for the desired valorisation, by defining the sorting equipment and settings based on the expected issues and the quality sought. A platform of lab-based sorting pilots has been implemented. Each sorter separates grains based on specific physical and/or biochemical characteristics. Grain-by-grain infrared optical sorting can also be considered for real-time, high-throughput quality control, in-depth analysis of batch quality and improved management of contaminants.

2) **Adaptation of quality criteria** to processing, by identifying and looking objectively at the relevant technological and sanitation criteria. Rheological analysis methods, as well as high-speed, non-destructive spectroscopic methods, have been improved in order to evaluate the quality of cereals more easily.

3) **Quality research** to provide advice to farmers and food processors about choosing varieties, recommendation about nitrogen fertilisation, batch mixtures and analysing new batches before and after harvesting. Preliminary tests of cylinder, millstone and semolina milling are conducted on lab-based pilots.

With these approaches, a significant portion of the grains will no longer be lost as they were before. Reducing these losses represents an economic gain for farmers and cereal processors. This is essential for transitioning towards a more sustainable and resilient Wallonia.

Funding: Walloon Recovery Plan

More information: www.cra.wallonie.be/fr/valcerwal

THE CRA-W IS CONTRIBUTING TO THE FIGHT AGAINST MAN'S GREATEST PREDATOR

The mosquito is considered to be man's greatest predator, accounting for nearly 725,000 deaths per year. It is capable of transmitting a series of dangerous – and even deadly – diseases by biting people to feed off of them.

One of the most effective ways to combat this pest is for affected populations to use mosquito nets that have been treated with an insecticide. This offers both a physical and chemical deterrent against these powerful carriers of disease.

Some of these mosquito nets, which are known as 'long-lasting', are the result of very advanced research. These next-generation products are far from just fabric soaked in an insecticide solution, and are capable of releasing insecticide in a controlled and gradual manner over a longer period (at least three years). They can also handle being washed more regularly, without the insecticide on the surface of the fibres being washed away.

As research progresses, new insecticide molecules are being used. These are increasingly difficult to incorporate into mosquito nets and to analyse. Indeed, the most commonly used insecticides belong to the pyrethroid family, which mosquitoes have become increasingly resistant to. Their resistance to pyrethroids, but also to other groups of insecticides in recent times, has triggered a real race against the clock, requiring close collaboration between stakeholders in the different research areas involved. The Walloon Agricultural Research Centre (CRA-W) is one such player. It specialises in the chemical characterisation of treated mosquito nets, and is currently conducting research on the physical and chemical properties of these new products. More specifically, these studies focus on the development, validation and standardisation of gas chromatography and high-performance liquid chromatography analysis methods as a means of identifying and quantifying new active substances in treated mosquito nets. The stability of the products over time, and when exposed to heat, the homogeneity of the treatment, the release characteristics of the active substance on the surface, its resistance to washing and the persistence of the active substance are also being studied.

In order to overcome the increased resistance of mosquitoes to insecticides, increasingly complex molecules must be used. These are, as a result, increasingly difficult to analyse as well. The CRA-W is recognised as a benchmark laboratory in this area, and an expert in the development of methods of analysis and physical and chemical properties that are essential to the development of new mosquito nets, as well as the validation of their performance when used in the field.

Contact: Marie Baes • m.baes@cra.wallonie.be

THE DECIDE+ PROJECT ENDS IN SUCCESS!

The DECiDE+ project has achieved its goals, by adding sustainability indicators while optimising the models used in the DECiDE tool and strengthening communications.

The DECiDE+ project was launched in 2022, with the aim of incorporating new environmental, economic and social indicators to improve the DECiDE tool. This tool is intended to assess the sustainability of farms in Wallonia. The new indicators aimed to make the tool easier to use, improve the models used and improve communications to make it accessible to a wide audience.

Three years later, the project has achieved its goals. Six **economic** indicators have been added, covering key aspects such as gross margins, gross operating surplus, agricultural income from work and family capital, debt burden, debt ratio and dependence on public assistance. This offers users a greater overview of the financial management of their farms.

When it comes to **environmental** factors, five new assessments or indicators, such as food autonomy, agro-ecological developments, nitrogen balance, eutrophication and acidification are already available, or are in the process of being incorporated, making it possible to evaluate the environmental impacts of farming practices in greater detail.

A **social** component is also being developed to complete the overall assessment of farms.

At the same time, the project bolstered the **accessibility** of the tool by organising multiple **training sessions**. To date, 160 people have been trained to use DECiDE, which has allowed them to master the different features of the tool.

The tool has also benefited from significant **technical modifications**, including the integration of a simplified module for feeding cattle, greater consideration of intercropping and updated reference data for more reliable and accurate analyses.

When it comes to **communication**, several changes have been made to make DECiDE more accessible and easier to understand. A **new design** and a **style guide** have been created, and a **YouTube channel** has been launched. The latter offers in-depth tutorials on how to use the tool. Furthermore, **explanatory sheets** about indicators, levers for action and template cases are being drafted, with the aim of helping users to better understand and apply these concepts. The tool has also been showcased at various regional and European events and festivals, in particular via an interactive game based around life-cycle assessment (LCA).

In short, the DECiDE+ project has achieved its goals by developing an improved tool, one that provides on overview of the performance of farms in Wallonia. Thanks to training sessions, educational resources and improved communications, DECiDE has become an essential tool for farming in Wallonia with respect to sustainability.

Funding: Walloon Recovery Plan

More information: www.decide.cra.wallonie.be/fr

Contact: decide@cra.wallonie.be

HOW TO MONITOR JEWEL BEETLES OF THE *AGRILUS* GENUS IN BELGIUM?

Agrilus jewel beetles, and in particular exotic species, are threatening forests in Wallonia. Monitoring them is crucial to prevent major damage.

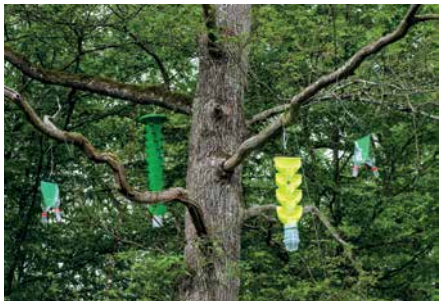
The AGRITAP project is led by the CRA-W in partnership with other Belgian (ILVO, PCfruit and ULB) and international (INRAE in Orléans, France and the Canadian Forest Service in Canada) institutions. Its aim was to develop monitoring tools to correctly estimate population levels of native species of jewel beetles (belonging to the *Agrilus* genus in the Buprestidae family), and to optimise early detection of exotic species. To this end, we compared the efficiency of several traps in capturing European jewel beetles in deciduous forests and pear orchards. We tested different colours (green or yellow),shapes (commercial traps with multiple funnels and homemade bottle- or fan-traps), and presence or absence of a decoy (dead *Agrilus planipennis* specimen).

Fluorescent yellow for visibility

We collected 2,220 samples from 382 traps across 46 sites in Belgium and France over two years (2021–2022). None of the traps were effective in capturing *Agrilus sinuatus* in infested pear orchards (17 specimens captured over two years). The presence of a decoy did not influence capture rates, regardless of the trap model or jewel beetle species or or. In general, fluorescent yellow traps (multiple funnels and fan-traps) were more attractive than green traps. Most *Agrilus* species followed this trend, with the exception of *Agrilus biguttatus*. For the latter, a greater number of specimens was captured by green traps with multiple funnels.

Increasing the number of monitoring locations

We observed a large variability in capture rates between sites: 64% of this variability was explained by the site effect, as opposed to 8.5% of the variability being linked to the trap types. Very few specimens were captured in a large number of sites, despite the presence of dying host trees that are favourable to the development of jewel beetles. For early detection of non-native species, it seems then essential to maximise the number of monitoring locations. In this context, the deployment of smaller traps that are easy to transport and set up, and less expensive, such as the fan-traps tested during this study, seems promising for monitoring jewel beetles. Preliminary trials conducted in Canada show that fan-traps can also capture non-native species such as *Agrilus bilineatus* (a pest of oak trees, which is considered to be at risk for Europe).



Traps tested in 2021 Photo: Gilles San Martin.

Funding: Euphresco project, funded by FPS Public Health (Project RI20/A337)

More information:
www.cra.wallonie.be/fr/agritrap

Contact: Alexandre Kuhn • a.kuhn@cra.wallonie.be

A SELECTION TO AVOID BOAR TAINT!

Tools and procedures are being implemented to perform genome selection on Piétrain boars with a very low risk of boar taint.

Historically, castrating male piglets has been part of the technical itinerary for breeding pigs. It helps to produce pork of impeccable quality by preventing the accumulation of compounds with unpleasant odours, and helps to manage the behaviour of fattening pigs in groups by avoiding mature animals from becoming aggressive and avoiding unwanted reproduction when the sexes are not separated. This practice has evolved over the years, taking into account the growing concerns of farmers and society at large with respect to animal welfare into consideration, as well as technological advances in breeding.

Since October 2018, the **NoWallOdor project** has aimed to develop procedures and tools that can be used to select Piétrain boars with a low risk of boar taint. This eliminates the need for castration, and makes it possible to raise piglets and fatten pigs that have not been castrated. This project includes strict monitoring of the animals from breeding through slaughter, meat analyses, phenotyping, including analyses of odorous compounds in the laboratory, and a sensory assessment of meat samples. It also involves developing a genetic-selection scheme, integrating genotyping and genome selection and developing genetic evaluation models within a consortium that includes ULiège, Elevéo, the CRA-W, the CER-Groupe and SoCoPro (the Producers' Association).

At this stage, a genotyping strategy has been implemented, with 2,705 animals genotyped and identified. At the same time, a database has been developed to record innovative phenotypes, with the aim of conducting genome evaluations by adapting multi-trait genetic methods. Soon, this work will enable the genome evaluation of growth, ingestion and carcass-quality properties. This information will be communicated to farmers on a regular basis. It will also be supplemented with estimates of the genomic breeding value as it pertains to 'odour risk'.

In order to optimise monitoring, and to continue developing these procedures and tools, the CRA-W acquired automated feeding, watering and weighing machines for pigs during the fattening period at the beginning of 2024 (Selfifeeder® and aqualab®, Asserva).

This equipment makes it possible to continuously measure individual performance (weight, ingestion of feed and water), and provides accurate behavioural data. In this way, it offers significantly improved measurements, taking data from the animals themselves rather than data from their living quarters.

More information: www.cra.wallonie.be/fr/nowallodor and www.awep.eu or www.cra.wallonie.be/fr/evaluation-genetique-wallonne-en-croisement-des-verrats-de-race-pietrain

Contact: José Wavreille • j.wavreille@cra.wallonie.be

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**.

Subscribe to our newsletter
www.cra.wallonie.be/en/newsletter

Centre wallon de a agronomiques
Bâtiment Lacroix • rue de Liroux, 9 • B-5030 Gembloux
Tel : +32 81 87 40 01 • Fax : +32 81 87 40 11
www.cra.wallonie.be

The photographs of this number are the property of CRA-W.

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

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.

Funding: FPS, D65-141/S2 agreement, coordinated by ULiège – Gembloux Agro-Bio Tech

More information:
www.cra.wallonie.be/fr/phenwheat

Contact: Damien Vincke • d.vincke@cra.wallonie.be

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_2 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_2 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:
www.cra.wallonie.be/en/spot

Contact: Michaël Mathot • m.mathot@cra.wallonie.be