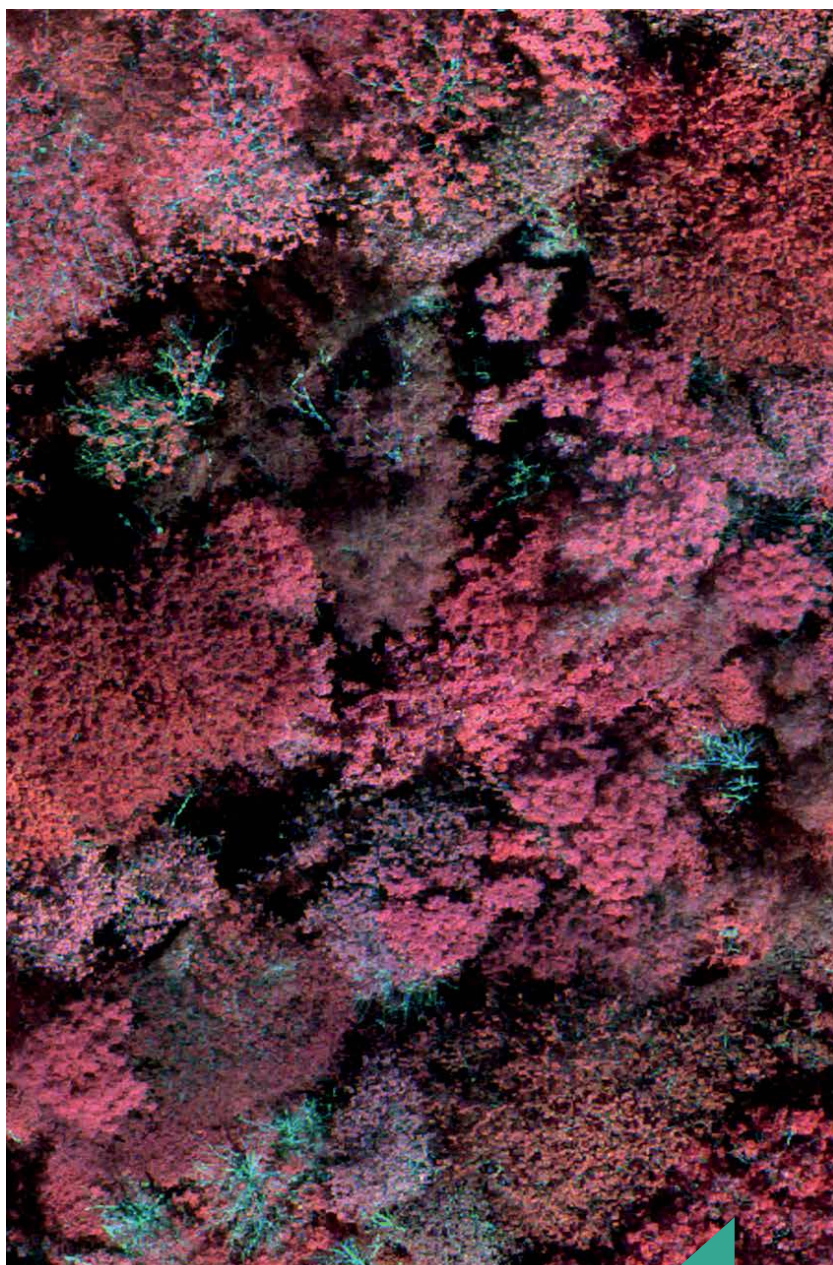




## THE STATE OF WALLOON FORESTS IN “THE ERA” OF CLIMATE CHANGE

**ON A GLOBAL SCALE, FORESTS ARE BEING AFFECTED BY INCREASINGLY NOTICEABLE CHANGES IN CLIMATE. WHAT DOES THIS MEAN FOR THE WALLOON FORESTS?**



The most plausible hypothesis for this fragile condition seems to be that it results from years of drought, which has had a negative impact on the availability of water. The increased temperatures observed in recent decades have also had the effect of lengthening the growing season (with a resulting impact on the access to water for trees), and facilitating the development and proliferation of pathogenic fungi and pestilent insects.

The CARTOFOR project is responding to this problem by developing methods for monitoring the state of health of forest stands consisting of ash, Douglas fir, larch, beech and spruce using multispectral and aerial satellite imaging. The approach is based on a wide range of field data collected by our partners (Gembloux ABT, UCLouvain, OWSF, DEMNA, DNF) over many years.

Depending on the species and the nature of the decline, the approach adopted is focused at the level of an individual tree (ash, beech) and/or the stand (Douglas fir, larch, beech, spruce).

While convincing results are already available, the soon-to-be-available hyperspectral satellite images should make it possible to supplement and improve the current CARTOFOR approach and lead to the implementation of an operational monitoring and alerting system (diseases, drought, fire, etc.) for Walloon forests.

This system can be easily integrated into the Système d'Information des Forêts en Europe [Forest Information System in Europe] (FISE), which is currently being set up as part of **the new EU strategy for forests by 2030**. This new strategy includes measures aimed at bolstering the protection and restoration of forests, and improving the sustainability of forest management. Monitoring and the efficient and decentralised planning of forests in the EU will help maintain the resilience of forest ecosystems and enable forests to fulfil their multifunctional role.

**Financement :** Project subsidised by the SPW, grant No. C2U06.LX3201.

## VERTICILLIUM WILT, A DISEASE AFFECTING FIBRE FLAX IN WALLONIA

**The PATHOFLAX project is aimed at helping farmers tackle verticillium wilt in flax.**

For some years, fibre flax has been affected by a fungal disease already known in other crops: verticillium wilt. This disease weakens the fibres of the flax, which then become brittle; this leads to poorer quality, making them less profitable for flax producers. The pathogen responsible for verticillium wilt in flax, *Verticillium dahliae*, can survive for more than ten years in the soil, and there is currently no means of controlling it.

The PATHOFLAX project (2019 – 2022) is aimed at helping farmers control this disease. It brings together 11 partners from universities, research centres and industries from France and Belgium. The CRA-W is participating in the project by offering its expertise in the monitoring of verticillium wilt in flax in Wallonia, and developing molecular tools designed to detect the disease in soils and flax seeds at an early stage.

The CRA-W has visited nearly 100 plots in Wallonia, and the pathogen has been detected in the soils of most of these plots. Its abundance varies from one field to another, and it is unevenly distributed within the same plot.

By analysing the soils, we have therefore been able to determine the extent of the inoculum in the fields sampled, but does soil contamination mean that the flax grown there will automatically be affected by verticillium wilt? To answer this question, samples of flax were collected from the same plots at the time of retting. This stage follows the pulling of the flax and involves leaving the stems lying on the field for several weeks, to enable the industrial extraction of fibres. This is when the typical symptoms of verticillium wilt are visible: the stems turn blue and brittle. No clear correlation has yet been established between the extent of inoculum in the soil and the severity of the symptoms observed on flax during retting. This means that the expression of symptoms on retted flax is also affected by factors other than the concentration of the pathogen in the soil. An investigation has been conducted among farmers whose soils were analysed. The responses collected must now be analysed to identify the factors that affect the level of infection in the soil and the development of symptoms in flax. Based on the results obtained, cultivation practices non conducive to verticillium wilt in flax will be recommended to farmers.

**Funding:** Projet Interreg V subsidié par le Feder et le Service Public de Wallonie, convention 1.1.350 PATHOFLAX

**For further information:** <https://www.interreg-pathoflax.eu> • <https://www.cra.wallonie.be/fr/pathoflax>



Retting the flax on a trial plot

## A CLOSE LOOK AT THE ORGANISATION OF WORK AMONG BEEF CATTLE FARMERS



**Work is an increasingly difficult issue for farmers. It has become a major question to be taken into consideration in strategic thinking in relation to farms.**



In order to gain a better understanding of the work involved in livestock farming and to offer support tools for advisers, the first «working time» references for the Walloon «suckler cow» sector have been created.

Although there has been enormous progress in labour productivity in agricultural farming, the workload has continued to increase in recent decades. This has led to a deterioration in the quality of working life and the attractiveness of the profession. However, new generations of farmers are particularly sensitive to the work life balance.

The organisation of work is a strategy that can be used to achieve this balance and improve the quality of life of farmers. To better understand the workload on beef cattle farms and its contributing factors, 70 Walloon farms with a diversity of farming practices were consulted as part of a survey. The key figures produced by the study have been summarised in a document for the sector.

The routine work, which includes daily compulsory tasks and is linked to the care of the herd (feeding, calves, mulching, etc.), has been studied in greater depth. It accounts for 66% of the working time recorded in the study, and therefore represents a priority if one wants to improve its working conditions. While the average time for routine work and monitoring required by a suckler cow is 25 1/2 hours, this varies greatly from one farm to another.

The results of the study were presented to the participating farmers and discussed in groups of 8, in order to clarify the variations observed with their experience in the field. This work has contributed to develop a tool enabling farmers to estimate the working time required in the suckling activity, depending on their farming practices. The tool offers a theoretical working time to help farmers and their advisers in the integration of work considerations in their daily planning as well as when changes are envisaged (expansion, changes of practice, etc.).

This study was carried out in collaboration with CGTA and Elevéo.

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## WAYS OF PRODUCING PELLETS AT A LOWER COST

**Recent events have highlighted the issue of our dependence on fossil fuels. Is the increasing use of bioenergy a way to escape this dependence?**

In Europe, bioenergies represent the main source of renewable energy consumed (64% of the renewable energy mix). They offer a solution for local, sustainable development through the intelligent use of forest and agricultural by-products. Among these bioenergies are pellets, which form a quality biofuel due to their high energy density and low cost of transport, the ease of storage and favourable combustion properties (low humidity, better yield, fewer pollutants). All that remains is to manufacture them, which can be costly in terms of energy... which in itself may be derived from fossil fuels.

In practical terms, the CRA-W Biomass Laboratory is developing some expertise



in the manufacture of pellets from various silvicultural and agricultural biomass residues, within the framework of the ENERBIO\* project. The main objective concerns the energy optimisation of this processing operation, by assessing the various operating parameters and their effects on the granulation procedure.

Preliminary results have, for example, shown that domestic quality pellets (EN Plus A1 standard) can be obtained from material that has undergone little or no prior drying (pelletisation at a high humidity of 23 to 40%), which would lower the costs of processing and investment in drying, often the most energy-consuming stage in the production chain. It should be noted that to guarantee standards of quality, these pellets ultimately have a moisture content of less than 10%.

Energy consumption models have been established using sawdust and woodchips taken from spruce, the species most commonly used in Belgium for the manufacture of pellets. But the idea of the project is also to switch to recoverable agro-biomass in

Wallonia, whose potential is currently still underestimated.

The next steps will be to scale up and confirm the results obtained in the laboratory (using a 7.5 kW press). We are hoping to arouse the interest of potential partners in order to increase the capacity of this new production method or use specific types of biomasses that have hitherto not been widely exploited.

*\* The aim of the ENERBIO project is to develop expertise in Wallonia in the generation of bio-fuels (solid, liquid and gaseous) from different biomass sources, and their energy recovery on small (e.g.: residential cogeneration) and large scales (e.g.: glass furnaces).*

**Funding:** FEDER "Centre d'Excellence en Efficacité Énergétique et Développement Durable" [Centre of Excellence in Energy Efficiency and Sustainable Development] C3E2D.

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## A PRAGMATIC APPROACH TO THE ASSESSMENT OF STRUCTURAL STABILITY IN SOILS

**The QuantiSlakeTest, developed by the CRA-W, enables a rapid assessment of the structural stability of soils, a significant factor in agro-ecosystems.**

In the large-scale arable farming systems of Wallonia, erosion and mudslides are commonly caused by intense precipitation events. These events are influenced by various environmental factors, such as the intensity and duration of precipitation, the condition of the crops, the slope and length of the plot, over which farmers have little control. On the other hand, the structural stability of agricultural soils, which is another factor to be taken into consideration, is directly influenced by practices in farming systems.

In the PIRAT project, the CRA-W has refined a new pragmatic method of quantitatively assessing the structural stability of soils. The QuantiSlakeTest is a disintegration test carried out on a soil sample under water. It is based on a test typically presented at public events: the Slake Test. The sample is continuously weighed and the values plotted on a curve which reflects the progression of the disintegration. Summary indicators can then be calculated from this.



Since 2017, our innovative approach has been applied across a variety of contrasting situations, ranging from the controlled conditions in long-term trial plots and the new platforms of the CRA-W system trials in Gembloux, to plots monitored as part of Walloon farming networks. The results show an overriding influence of tillage practices (ploughing, simplified cultivation techniques) on structural stability of soil as we measure it.

After the initial prototyping and development stages, the approach now benefits from a standardised core protocol made available for regular monitoring of the CRA-W plots. The experiment has also been the focus of specific interactions with partners in the sector: higher education institutions (HELHa, HEPN), universities (ULg/GbxABT, UCLouvain), advisers and support structures (Greenotec).

Looking ahead, we intend to distribute the protocol publicly and make the entire programme (R and ShinyApp) freely accessible in open-source.

Video of the slake test: <https://www.youtube.com/watch?v=G9UweThvHYI>

**Funding:** Moerman project, CRA-W

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# THE CRA-W AT THE HEART OF THE DIGITAL REVOLUTION THROUGH THE USE OF CRAWLSPEC

**In order to centralise and facilitate access to spectral data derived from vibrational spectroscopy and the corresponding metadata, the CRA-W is developing an original solution called **CrawlSpec (Centralised Reference Analytical Web-accessible Library of SPECTra)**.**

**CrawlSpec** assembles the tools necessary for the supply and use of the database with a focus on 4 main features: *the centralisation, integration, extraction and exploitation of data*. The initial step is the introduction of semantics to identify the different items included in the database: data identifiers, product categories, and qualitative and quantitative analytical parameters. Using an MS Excel file structure, the qualitative and quantitative reference data generated by various laboratories and experimental units, both internal and external to the institution, can then be centralised according to the project.

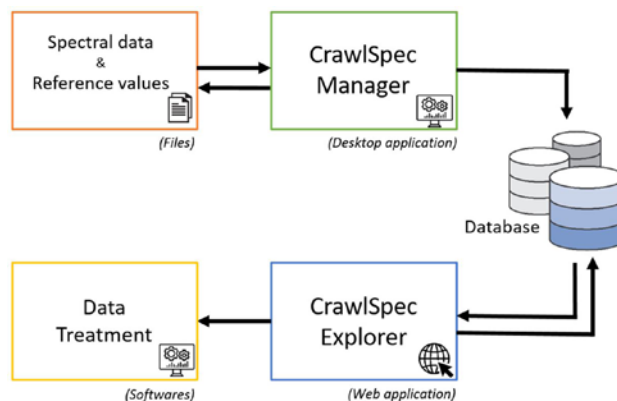
All the spectral data files acquired in the laboratory or on site are stored in proprietary format, in a tree diagram set out according to the type of instrument, product category and project. On this basis, a local computer application (**CrawlSpec Manager**) integrates the information into a centralised and secure database and confirms its integrity.

Another functionality offers a web application (**CrawlSpec Explorer**), which is designed to submit queries to the database. By accessing this simple interface, users can extract spectral data and the corresponding metadata. This can be done by

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following standardised queries relating to a product category, project or batch of samples.

The results are exported in different file formats according to the specifications of the user.

**CrawlSpec** makes it possible to extend the exploitation of data for the development of calibration and discrimination

models. This spectral data management tool will support the agricultural and food sectors in the implementation of Industry 4.0. It will also help share CRA-W expertise in the field of optical sensors and modelling.

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**The events organised as part of this anniversary year can be found on the website: [www.cra.wallonie.be/en/150years](http://www.cra.wallonie.be/en/150years)**