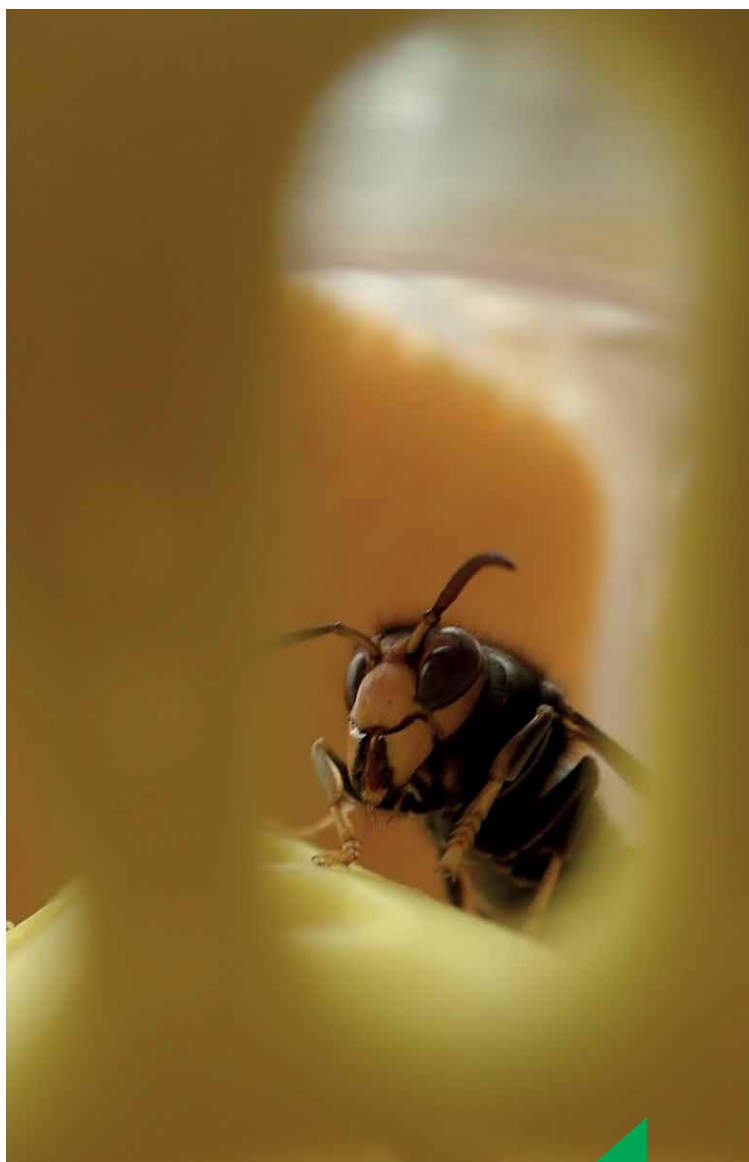




COMBATING THE ASIAN HORNET: THE FOUNDRESS TRAPPING CAMPAIGN

AS PART OF ITS HORNET PLAN, THE CRA-W HAS DISTRIBUTED 6,524 TRAPS THROUGHOUT WALLOON IN THE SPRING, WITH THE GOAL OF EVALUATING THE EFFICACY OF THIS TRAP, AND ITS SELECTIVITY WITH RESPECT TO NON-TARGETED SPECIES, UNDER NATURAL CONDITIONS.



By now, the Asian hornet (*Vespa velutina nigrithorax*) is well established in Wallonia, and eradicating it remains an illusive prospect. In addition to its impact on human health and biodiversity, this invasive species is having a direct effect on the bee-keeping industry. As a result, it is important to develop a sustainable management strategy that combines various approaches. In addition to neutralising nests, trapping foundresses in spring (March–May) appears to be a promising approach. However, it is controversial, since its attractiveness is limited without pheromones, as well as the potential negative effects on non-targeted species (wild bees, queen bumblebees, etc.) when using drowning traps (wasp traps), among other issues.

The CRA-W perfected a model for a T082 pot trap with a cover in 2023. This was designed using 3D printing. After a series of lab tests, the entry and exit holes were calibrated to the nearest millimetre, so that the pot holds the Asian hornet while allowing other insects to escape. This also prevents European hornets from entering the trap. Production was carried out via plastic injection, in order to ensure the size of the holes and reduce costs.

CRA-W called on beekeepers and municipalities to validate the efficacy of this trap. Of the 6,524 traps distributed throughout Wallonia, we collected observations about capture rates from more than 3,125 traps (48%). In total, more than 815 Asian hornet foundresses were captured with these traps. The low capture rate that was observed in certain areas can be explained by the density of this invasive species still being low, in particular in the east of the region. Furthermore, the bait that was used could also be improved – several participants noted that the grenadine was quickly pillaged by bees, which made the trap less attractive. Studies are ongoing regarding the addition of a repellent to keep bees away (alcohol, yeast, acetic acid, etc.).

In terms of the selectivity of the trap, if we exclude bees, ants and flies that enter and exit the traps without being captured, 67% of the insects captured were Asian hornet foundresses. This selectivity rate is very good compared to other traps mentioned in scientific literature, which have selectivity rates below 30%.

Given this good selectivity rate, this initial trapping campaign validates our development of this technique. A new campaign will be rolled out in 2025, with a few adjustments to improve the attractiveness of the traps, in order to determine the optimal density of traps that need to be deployed around an apiary.

AT THE HEART OF UNDERSTANDING AGRO-ECOLOGICAL TRANSITIONS WITHIN EUROPE

The CRA-W is exploring and analysing around twenty agro-ecological initiatives across Europe, with the aim of promoting more sustainable and innovative practices.



The extensive agricultural diversity within Europe is fertile ground for developing innovative systems. This vast potential is a source of inspiration for promoting more sustainable agricultural practices, namely practices that are adapted to climate change, profitable for farmers and good for biodiversity. The **Agroecology-TRANSECT** project is based on these three pillars, and aims to develop agro-ecology in Europe and further afield. To this end, researchers from the CRA-W visited more than twenty agro-ecological initiatives across Europe, in order to analyse them and gain an understanding of their work. This makes it possible to support them in their transition, to allow other initiatives to take inspiration from them and to provide feedback on their needs and the challenges that they face to policy-makers in Europe. Through the implementation of a methodology that combines agronomy and sociology, interviews were conducted with key players with a variety of profiles (farmers, researchers, food processors, distributors, etc.) from each initiative, in order to gain a better understanding of the context in which these initiatives developed, the players within each initiative and around them, and the barriers to, and levers which enable, their development.

It is possible to highlight the Walloon initiative among the various agro-ecological initiatives explored by the Agroecology-TRANSECT project. It is focused on a group of farmers that are combining organic farming and conservation farming, and is being piloted by the CRA-W in collaboration with Greenotec. This initiative faces a number of challenges linked to the cross-disciplinary collaboration between farmers, consultants and researchers, the time spent by farmers on a voluntary basis and the need for long-term funding to support system experiments. Technical challenges, such as the lack of flexibility and diversity of machines for experimenting with new practices, were also noted. The challenges encountered are similar to those faced by a Danish initiative working on conservation farming. Despite the contextual difference, this initiative faces similar challenges in terms of both technology and collaboration between farmers and researchers. In contrast to this, an initiative in Greece is striving to develop sustainable agricultural tourism in a Mediterranean setting, where issues relating to the climate are particularly noteworthy. Although the nature of this initiative is very different, it faces the same challenge as those we have previously mentioned: reconciling practical needs on the ground with research methods and expectations.

In the future, the CRA-W will cross-reference these results to make transversal conclusions, with a view not only to helping develop agro-ecology within Europe, but also influencing European policy, by submitting results from the field to decision makers within Europe.



Funding: European Commission (Horizon Europe framework programme, HORIZON-CL6-2021-CLIMATE-01-05 call for projects)

For more information: www.cra.wallonie.be/en/agroecology-transect

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MAXIMISING DIVERSITY IN THE FIELD IN ORDER TO IMPROVE RESILIENCE AND ADAPTABILITY?

Wheat and spelt population varieties: development and assessment of composite cross populations (CCPs)



Diversity of a spelt CCP

What is a CCP? CCPs are diverse and evolving populations - resulting from multiple crosses between several varieties. The parent varieties are crossed pairwise and their offspring are mixed to form the founding population. Unlike in the broadly cultivated, perfectly homogeneous pure-line varieties, each plant in a CCP is potentially genetically different from all other one at the field level. Each year, seeds of the previous harvest are sown. As a result, the population evolves year after year, depending on the location where it is cultivated, under the effect of natural selection.

What is the interest? The positive effects expected from this diversity are the adaptability of the population to different environments (through the evolution process) and the yield stability, due to compensation and complementary relationships between plants. This type of material has attracted enough attention in organic farming in recent years to be subjected to a regulation by the European Commission, which concerns 'the production and marketing of plant reproduction material of organic heterogeneous material'.

Creation of wheat and spelt CCPs. The CRA-W has created two spelt CCPs whose founding populations were constituted in 2020. Additionally, two CCPs resulting from crossing ancient wheat varieties, and aimed at the artisanal bread-making sector, were created as part of a collaboration between the CRA-W, ULB, Biowallonie and Li Mestère. These populations are currently evolving in different environments in organic farming. One of the wheat CCPs is also evolving under drought stress, as part of a research collaboration with UCLouvain.

Research questions. In addition to evaluating the performance of these populations (yield, disease tolerance, canopy cover, baking quality, etc.), research is also being conducted on the evolution of the phenotypic and genetic diversity of these populations at both aerial and root levels as part of Master and PhD theses co-supervised by CRA-W.

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THERMALLY MODIFIED WOOD: PROMOTING A LOCAL RESOURCE FOR A BIO-BASED, CIRCULAR ECONOMY

Two projects from the CRA-W Wood Technology Laboratory (LTB) are dedicated to thermally modified wood, in order to promote the use of local hardwood species.

What is thermally modified wood?

Wood thermal modification is a process that aims to induce irreversible chemical changes in order to provide wood certain properties. This is achieved by exposing the material to high temperatures (approximately 200°C) in the absence of oxygen. This is also known as torrefaction.

By degrading a portion of the hemicelluloses, which represent 20–30% of the mass of the material, the wood absorbs less water and becomes less susceptible to fungal attacks. It is said that the wood becomes more durable. The reduction in the hydrophilicity of the wood also improves its dimensional stability: the wood becomes less prone to swelling and shrinking. In this way, thermal modification makes it possible to use the wood outdoors when the species is not naturally suited to this usage. This is particularly interesting for several hardwood species found in Wallonia, which are weakly durable or not durable at all, despite boasting advantageous mechanical properties.

Everything has a downside though: wood thermal modification lowers some of its properties, including stiffness and strength. The modifications made to the original properties can vary considerably, depending on the temperatures the wood is exposed to, as well as on the

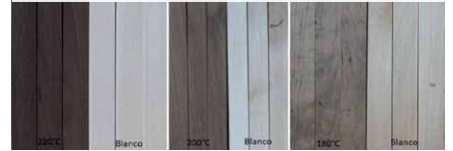
duration of the exposure. Therefore, the challenge for manufacturers is developing a product whose properties are clearly controlled, making it possible to ensure the material is fit for its intended uses.

What research is the CRA-W conducting?

The DURPOP project, which is being carried out in conjunction with the LTB and the Belgian company DURWOOD, aims to develop thermal-modification procedures of poplar boards for use as cladding. Achieving this goal will provide an alternative to using biocidal products to preserve the wood (the poor natural durability of poplar wood is not conducive to being exposed to weather conditions) and to importing exotic species (e.g. Western Red Cedar or Ayous). The absence of biocidal products in wood also makes it easier the recycling of the material at the end of its life cycle.

Furthermore, current industrial procedures are long (approximately 36 hours per cycle) and energy intensive. To this end, the RADIOWOOD project has been designed to improve the energy efficiency of the thermal-modification process. Wood can be heated using electromagnetic waves (microwaves or radio frequencies), just like food in a microwave. This process is referred to as dielectric heating. This instantly acts in the core of the material

Boards that have been thermally modified at different temperatures compared to unmodified boards (Blanco).



and causes the wood to heat up throughout its volume. This makes it possible to avoid the thermo-insulating properties of the wood, and to reduce the time required to achieve a given temperature, making it ten, or even one hundred times faster. The RADIOWOOD project, which has been conducted in conjunction with the LTB, ULiège (Institut Montefiore) and the company Technic One, aims to integrate dielectric heating into an industrial process of wood thermal modification. The results obtained via this research could also be used for the drying and sanitary treatment of wood, as these processes require lower temperatures.

Funding: The Walloon Recovery Plan, under the coordination of Filière Bois Wallonie

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YOUR OPINION ON THE ADOPTION OF CLIMATE-FRIENDLY FARMING PRACTICES MATTERS

What factors influence your decision to adopt, or not adopt, climate-friendly farming practices on your farm?



Your experiences, whether positive or negative, opinions and knowledge of farming systems are essential, regardless of whether or not you have already adopted certain practices!

In order to gain a better understanding of the factors that facilitate and encourage the adoption of climate-friendly practices, or, on the other hand, the factors that impede, block or discourage the implementation of these practices on farms, ClieNFarms has a questionnaire for farmers, which can be found on <https://tinyurl.com/clieNFarms>.

However, the ClieNFarms project also refers to 19 networks of farmers within the European Union, who integrate and test solutions and practices in situ. These solutions and practices are chosen in a participatory manner, adapted to the local context and lead to a reduction in greenhouse gas emissions and/or an increase in the amount of carbon stored in the soil. The variety of networks distributed across the EU cover a range of production systems and different soil types and climates. A greenhouse gas assessment is carried out (using the CRA-W DECIDE tool and the Cool Farm tool) on each farm, in order to analyse the farm at the onset of the project and help choose the practices that should be implemented.

In Wallonia, the CRA-W supports and manages a network of nine farms, which are members of the SCAM-ACS club and mainly grow cash crops. In addition to the impact on the climate, the goal is that the practices that are implemented will also lead to an overall improvement in the production

system, and make farms more sustainable. The participatory choice of the practices that are developed and monitored within this group primarily concerns:

- intercrops coverage (greater success/improvement/monitoring): to restore nitrogen to the crops and help store carbon in the soil;
- optimisation and/or reduction of synthetic nitrogen fertilisation.

Additional practices are also implemented within the farms in a differentiated manner based on their situation, production system and greenhouse gas assessment.

Funding: Project subsidised by the EU, Agreement no. 101036822

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EUROPEAN EXPANSION AND ITS IMPACT ON THE AGRICULTURAL AND AGRI-FOOD SECTORS

The European Economic and Social Committee has issued an opinion on the expansion of the European Union to countries such as Ukraine, and the impact of such an expansion on the agricultural and agri-food sectors.

Several countries, notably the Balkan states, have applied for EU membership over the past twenty or so years. Moreover, the war in Ukraine has expedited the political decision to begin negotiations with Ukraine. To this end, the European Commission has asked the European Economic and Social Committee (EESC), a consulting body that represents civil society, to draft and disseminate an 'exploratory opinion' on the main issues raised by this potential expansion in the agricultural and agri-food sectors.

The situation of the candidate states

Ukraine is the 'heavyweight' among the candidate states by a considerable margin. The amount of land dedicated to agriculture there is equal to that of Germany and Poland combined, and it has become one of the world's leading exporters of cereal grains and oilseeds. The blocking of its exports via the Black Sea has led to major disruptions in the markets of some EU member states.

The other candidate states are modest in size, and their agricultural sectors are not very developed and are unprofitable.

Opinion of the EESC

On 11 July 2024, the EESC voted on the opinion during a plenary session. The opinion includes the following key points:

- The candidate countries must be well prepared. They must adopt and implement European legislation and values before becoming member states;
- The attention of authorities must be focused on family-run farms and small enterprises in the EU and candidate states, as they may suffer negative consequences as a result of the expansion;
- Reliable, accurate and detailed data about the agricultural and agri-food sectors in the candidate states must be made available;

- The CAP must be reformed prior to expansion, and the candidate states must be prepared to adopt its values and objectives. A sufficient budget must be allocated to it, and it must focus on the social and environmental contributions of the agricultural sector. Aid must be capped;

- Candidate states must be integrated gradually;

- Every part of the EU must have optimal food security, and a local economy must be developed.

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Expert to the Rapporteur of the Study Group of the European Economic and Social Committee that prepared the 'Enlargement and the EU agri-food sector' opinion

A COLLABORATION BETWEEN RESEARCH AND INDUSTRY: THE NIRFLOW PROJECT

CRA-W's expertise in near infrared spectroscopy is also beneficial for the industrial development of chemistry in Wallonia.



Flow chemistry refers to an approach to chemical synthesis in which reagents are introduced, and products are extracted, on a continuous basis within a reactor. When compared to traditional, so-called 'batch' chemical synthesis, this approach is safer, makes it possible to produce products closer to the location where they are used, increases productivity and reduces the consumption of raw materials and energy.

Flow chemistry makes it easier to control reactions, but tools are needed to instantly

measure the quality of materials entering and leaving the reactor. This is where near-infrared spectroscopy (NIRS) comes in. By monitoring the concentrations of residual reagents and the desired product in the solvent, NIRS makes it possible to monitor the reaction in real time, to confirm that the product satisfies quality standards and to immediately detect potential risks.

A fruitful collaboration unfolded between *Chemium*, a company based in Louvain-la-Neuve, and the CRA-W in 2022 and 2023, as part of a Walloon FIRST Enterprise project named **NIRFLOW**. As part of this project, the CRA-W successfully implemented NIRS monitoring for flow chemistry synthesis of Grignard reagents, unstable chemical compounds that are in great demand in the pharmaceutical, agro-chemical and cosmetic industries. They developed an interactive chemometric tool that can be used to develop optimised spectral calibrations for different reactions, as well as transferring these calibrations from an experimental or pilot reactor to a large-scale production unit. They also had the opportunity to present their results at the international ICNIRS conference in August 2023.

For *Chemium*, this project represented an opportunity to develop and promote its technology for synthesising Grignard reagents via flow chemistry, which they market all over the world. The good news is that NIRS is also a technology that only gets better with time. The more new measurements are added to the databases from new experiments, the higher the quality of the predictions, meaning its potential will evolve.

For the CRA-W, this was a new opportunity to compare NIRS, one of its preferred techniques for quality control, with the requirements of a challenging modern industrial process. There is no doubt that the information obtained will also make it possible to offer greater advice and support to companies in the agricultural and agri-food sectors in the future.

Funding: F.I.R.S.T. SUBSIDY – ENTERPRISES, Agreement no. 8601

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