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# AGROECOLOGY, A WAY OF TRANSITION FOR AGRICULTURE

**CRA-W joined the Interdisciplinary Agroecology Research Group of the National Scientific Research Fund (GIRAF)[1] in 2009. This contact group brings together scientists from a number of universities (UCL, ULB, ULg, FUNDP, UGent) and research centres (CRA-W, ILVO) in the kingdom who study agriculture via a novel approach, namely agroecology.**

Agroecology, a scientific discipline that emerged in the twenties at the interface between agronomy and ecology, can nowadays be defined as an ecosystem approach to the study, design and management of agricultural and food production systems.

This discipline is also associated with agricultural practices and a highly developed social movement in Latin America. In the nineteen-seventies and eighties agroecology established itself through a comparison of traditional mixed farming systems with monoculture systems born of the Green Revolution, which are often less productive, more vulnerable to pests and big consumers of inputs.

Whereas ecologically intensive agriculture aims to make biological processes more efficient within the crop and agricultural systems, agroecology on the other hand takes a global (holistic) approach, looking not only at the plot or the farm but also at the entire food production system (from the producer to the consumer, including all the stages in between) from an interdisciplinary point of view that involves not only agronomists but also economists, sociologists, ecologists, etc.

This approach is useful for addressing the numerous issues arising in agriculture. Agriculture is in fact expected to maintain or even increase food production and at the same time to reduce environmental impacts and use of inputs, while enabling farmers to make a decent living, against a background of rapid, global climate, energy and economic change. This will only be possible if a transition in agriculture, and food production systems more generally, gets under way quickly, as was recently stressed at a European Parliament conference[2].

Through its holistic approach and by taking into account in particular the interactions, sociotechnical lock-ins and irreversibilities, agroecology will ease the transition of our food production systems towards more sustainable systems from an economic, social and environmental point of view. In practical terms, 13 principles have been established by the GIRAF group and will be put into practice by CRA-W, among others, to guide future research so as to enable our agriculture to meet the challenges facing it while maintaining diversity.

To find out more:

[1] www.agroecologie.be/index.php

[2] The potential of agroecology: Reclaiming the food crisis, 9.11.2012, Brussels www.greens-efa.eu/the-potential-of-agroecology-7300.html

[3] www.agroecologie.be/principles.php

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# SOLUTIONS FOR THE HORSE CHESTNUT TREE IN BELGIUM?

## Horse chestnut tree trunk canker is threatening the magnificent trees that line our roads. CRA-W is investigating the disease.

Originally from the Balkans, the horse chestnut tree is much admired for its imposing appearance. It is grown along roadsides or, individually and in small stands, as an ornamental species. Its future currently hangs in the balance due to a disease that has made considerable inroads in the last few years – horse chestnut trunk canker. The disease causes cortical tissue to die and bark to detach from the trunk and branches, so that within a few years a tree can die. The extent of the problem throughout Belgium prompted CRA-W to conduct a three-year study, financed by the Brussels-Capital Region, aimed at understanding the disease and finding ways of controlling it.

The pathogenic bacteria responsible for horse chestnut trunk canker in Belgium and Western Europe have been identified as belonging to *Pseudomonas syringae* pv. *aesculi* group 2, very similar to *Pseudomonas syringae* pv. *aesculi* group 1 which causes leaf damage to the Himalayan horse chestnut in India. The project results appear to indicate parallel development of strains of *Pseudomonas syringae* and their *Aesculus* hosts, i.e. long-standing interactions. This is therefore not a new pathogen in Western Europe. Nurseries are known to be sources of infection. The pathogen may produce symptoms at the nursery, or pass unnoticed on the surface of the plant.

The study of the life cycle shows that the pathogen lives with no apparent symptoms on the surface of the leaves, flowers, buds and branches of the horse chestnut tree, not needing an alternative host. The cortical tissues of the trunk and branches are infected from the colonised aerial organs. The internal cycle is aggressive and may be continuous, without the need for reinfection from year to year, or it may halt locally or completely, indicating some tree resistance. The possibility of continuous attack makes this disease more dangerous, as a single infection can cause considerable damage over time. Stress is thought to aggravate its severity, in particular the stress caused by major attacks of *Cameraria orhidella*, a leaf miner which appeared shortly before the significant canker outbreak.

A small number of *Aesculus* species or varieties with some resistance to horse chestnut canker were selected in the context of the project. These species offer substitution alternatives of varying suitability. The project has also shown that a healthy horse chestnut plantation can be maintained over the long term. Pathogen occurrence is therefore neither systematic nor unavoidable. Horse chestnut trunk canker could thus be controlled by effective prevention. Popularization of the results is expected to lead to more sustainable management of existing and future plantations in Wallonia.

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# HUNTING DOWN ROGUE PROTEINS IN LIVESTOCK FEED

## Conceptual and technical developments in genomics and proteomics are used to detect, identify and establish the origin (species and tissue) of proteins in livestock feed.

Apart from fishmeal, the use of processed animal protein (PAP) in livestock feed is currently completely banned. The European Commission is considering new regulations allowing the gradual reintroduction, under stringent control, of pig and poultry PAP. The introduction of this new legislation means that control methods will have to be stepped up in order not only to detect unlawful protein in livestock feed but also to determine its origin (species and tissue). The analytical methods currently used, alone or in combination, do not cover all cases.

CRA-W, CER Groupe and the University of Namur have formed a consortium to develop new control methods better suited to the coming regulations on PAP use. One line of research aims at widening the field of use of PCR to avoid interference by authorised products such as dried milk. The application uses the relationship between DNA methylation and cell and tissue differentiation to develop tissue-type specific PCR tests. A second line of research is aimed at obtaining peptide populations representative of the sample by controlled protease digestion. The mass spectrometry profiles enable the species and tissue origins of the protein components of feed to be determined.

The background to this project is transition to protein independence and increasing the sustainability of agriculture in Wallonia.

This initiative has the financial support of Federal Public Service (SPF) Public Health, Food Chain Safety and Environment. Contract Research Division (Agreement RF 11/6243 PeptidoGenomics).

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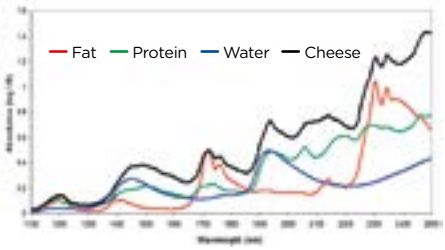
# CRA-W'S INFRARED SPECTRAL DATABASES

## Rapid, inexpensive, new analytical methods need to be developed as a matter of increasing urgency to meet the needs of manufacturers and farmers.

*Using near infrared spectroscopy to analyse food and feed products (milk, animal feed pellets, cheese).*




In view of developments in production and processing methods and changing environmental conditions, efficient analytical tools are imperative for quality control of inputs and finished products in agriculture and food processing. Manufacturers need robust instruments and rapid, multi-component methods for continuous analysis for real-time on-site quality control while at the same time reducing the need for costly, polluting separative methods. In addition, the complexity of industrial processes requires ever-purer basic ingredients and detection of ever-smaller contaminant concentrations.

The CRA-W laboratories have a track record of expertise in analysis of agricultural products by reference methods. In addition, for the last 30 years or more CRA-W has been developing analytical solutions using spectroscopic methods coupled with chemometrics for quality control of agricultural products. The Centre can grade the main quality parameters (protein, fat, fibre, starch, sugar, digestibility, etc.) over a wide range of food and feed. CRA-W's near infrared databases contain the spectral profiles and reference analyses of nearly 100,000 samples. The laboratory is equipped with most of the infrared spectrometers (near and mid infrared and Raman), including one infrared microscope, two hyperspectral imaging cameras and three portable instruments. Through its international influence CRA-W manages several instrument and feed spectral database networks via national (REQUASUD) and international (PROVIMI, INGOT, OPTIMIR) cooperative links.

This expertise is used to meet the needs of farmers and food processing and non-food manufacturers (biomass, biofuel, sustainable chemistry, etc.), offering solutions for control laboratories and production and storage units that are required to operate effective self-surveillance. Development of these rapid measurement tools will enable products that are economically attractive in nutritional and/or technological terms to be characterised. The intention is to give producers and processors more detailed knowledge of their processes, products, co-products and waste so that they can play their part in developing sustainable industries and contribute to improving the quality of agricultural products for the user and consumer.

For more information visit:
www.cra.wallonie.be

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# HORTICULTURE AT CRA-W

CRA-W outlined its support for the horticultural industry in terms of diversity, quality and crop protection at the conference held in Gembloux on 19 December 2012 to mark the Walloon Horticultural Federation's fifteenth anniversary.

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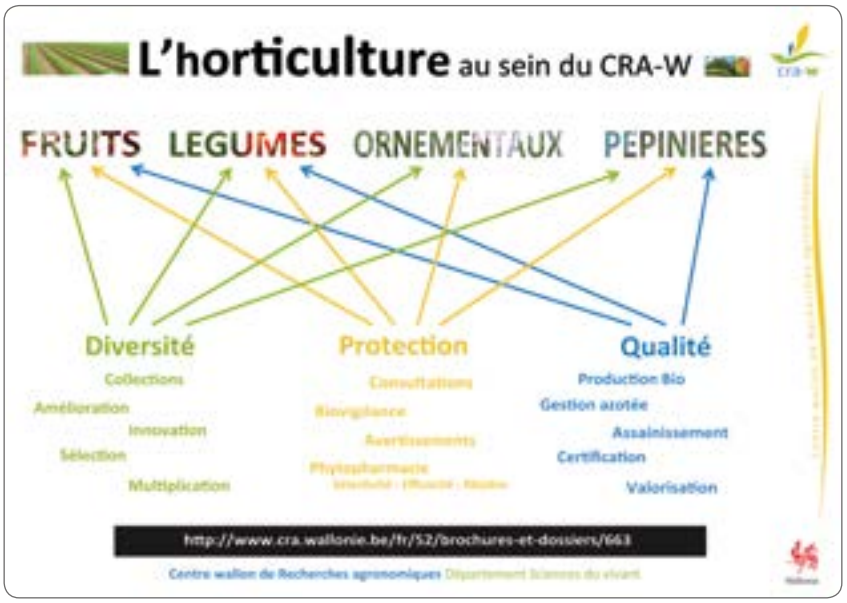

# HOW BIG A RISK TO PLANT HEALTH DO POSPIVIROIDS IN HORTICULTURE ACTUALLY POSE?

## In recent years various pospiviroids have been detected on ornamental solanaceae, raising the issue of the risk of transmission to tomato and potato crops.


©Photo: T. Olivier

*Stunting caused by artificial inoculation with various pospiviroids in tomato plants.*

Since the late eighties tomato crops across Europe have sporadically suffered severe damage from tiny infectious organisms, smaller than viruses, which virologists have grouped under the name of 'viroids'.

The first infection in Belgium occurred in 2006, in a tomato crop. Analysis of this case, which was subsequently eradicated, identified the causal agent as the *potato spindle tuber viroid* (PSTVd). Controlling this pospiviroid species (one of the eight genera comprising the viroids) was already compulsory in potatoes, where it can cause yield losses of around 65%, and discovering that this pathogen could also damage tomato crops prompted the FASFC to tighten up its controls and commission a detailed study of these infectious little RNAs. This was a potentially explosive situation as, apart from these focuses in tomatoes, an increasing number of ornamental plants also turned out to be infected by pospiviroids, though with no apparent symptoms. This then led the European Union to bring in legislation extending the control of PSTVd to the most susceptible ornamental plants, namely *Solanum jasminoides* and *Brugmansia*.

In response to the FASFC's concerns and to remedy the lack of relevant information for an accurate assessment of the viroid risk, a research project titled TOPOVIR was launched, coordinated by CRA-W and financed by Federal Public Service (SPF) Public Health, Food Chain Safety and Environment. Through this project, different inactivation methods were assessed, ability to detect these pathogens in Belgium was improved, sources of infection were homed in on and concerns regarding ornamental plants were at least partly allayed, while at the same time identifying some potential transmission routes for further investigation in future studies.

With the benefit of this experience and in order to contribute to setting up a consistent EU-wide pospiviroid risk management strategy, CRA-W has now become involved at European level as coordinator of the DEP2 pilot project (Euphresco2). Work is now focused on the interspecies transmission routes identified in the TOPOVIR project, confirming the best inactivation methods, investigating the seed transmission risk in tomatoes and developing a robust detection method for tomatoes.

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# 15 WALLOON BEERS AWARDED PRIZES BY INTERNATIONAL JUDGES

The first Best Belgian Beer of Wallonia (BBBW) competition was held in cooperation with CFGCW (Wallonia Field Crops Promotion Board, housed at CRA-W), APAQ-W (Walloon Agency for Promotion of Quality Agriculture), OPW (Office of Walloon Products), the Department of Agriculture, Natural Resources and the Environment, Gembloux Agro-Bio Tech (Association for Promotion of Barley Growing for Brewing) and AJBB (Association of Belgian Brewing Journalists).

The aim of the competition was to promote and reward the best Belgian beers brewed in Wallonia and marketed by the breweries under their own name, with annual production of at least 15,000 litres. A total of 35 breweries took part in the competition, with more than 80 beers entered in all the categories taken together.

The international panel of judges was made up of journalists, distributors, scientists and representatives of the brewing industry.

Of all the Walloon beers entered in the four categories (wheat beer, lager, amber beer and brown ale), each of which was divided into subcategories according to alcohol content, a total of 10 beers were awarded a prize, with 5 winning second prize (prize for excellence). A press conference was held at the Abbey of Notre-Dame de Saint-Remy in Rochefort on 25 May 2012. The results are available at www.cfgcw.be, www.apaqw.be and on the Facebook page 'J'aime les produits wallons'. It is hoped that the competition will become a biennial event.

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