



POST REGISTRATION VARIETY TRIALS, THE RIGHT VARIETY IN THE RIGHT PLACE

WHILE THE MAJORITY OF AGRONOMIC FACTORS (SEEDS, FUNGICIDES, FERTILISERS, HERBICIDES, GROWTH REGULATORS, PLOUGHING, INSECTICIDES) ARE SUBJECT TO CRITICISM AND SERIOUS QUESTIONING, THE DIVERSITY AND ROBUSTNESS OF CEREAL VARIETIES REMAIN A KEY TOOL IN FACING THE CHALLENGES OF TOMORROW.

For most people, "variety" is a scientific term meaning "some kind of". For others it is synonymous with the concept of species. And others, the vegetable garden or good food lovers, are familiar with the agronomic meaning through *Conference* pears or *Lambda* strawberries.

As for the term «registration», this refers to a list of varieties authorised for marketing. Inclusion on this list is determined by success in tests and agronomic trials. For cereals grown in Belgium, these tests are carried out jointly by the ILVO and CRA-W.

The number of cereal varieties is constantly increasing. Dozens of varieties are registered in Europe every year. The goal of the research into cereal variety is not to find a variety that satisfies the taste of consumers, but to sustain the fruitful varieties while increasing the levels of tolerance and resistance in plants.

Each year, we are confronted with new insects, which are migrating to higher latitudes due to rising temperatures. Fungi, bacteria and viruses are continually mutating,

enabling them to overcome the resistance of plant varieties. They also board planes, boats and trains, rapidly colonising vast areas.

At the same time, there is an increasing desire to reduce the number of crop protection products.

We have recently entered a new era of climate change. With droughts occurring in rainy areas, temperatures of 19°C at Christmas and -5°C on 20 April, many extraordinary events have become commonplace, and are affecting our crops. Resilience has become a buzzword, but plants have very limited resilience and crop failures are increasing.

The only real alternative that will not affect our health or the environment is to create and regenerate a wide range of suitable varieties. Once the varieties are registered, there is then the task of determining which variety will be most suitable for each situation. The destination of the end product, the growing region, the farming practices, the soil and its history are all factors that will influence the choice of farmers. To help them, the CRA-W and its partners are setting up so-called

"post-registration" trials. The CRA-W is currently renovating and developing trial networks, favouring low-input pipelines. The White Paper is still the reference standard for cereal farmers, but this has also undergone a drastic facelift: the drafting of recommended lists now enables farmers to see the value of choosing more tolerant varieties that reduce the need for chemical protection products.

Oat and triticale networks have now been established to enable farmers to diversify. These are being added to existing networks (wheat, spelt and barley).

If you would like to know more about this subject, join us at the trial visits organised each year during May and June.



Guillaume Jacquemin
g.jacquemin@cra.wallonie.be

Sign up for this quarterly free on our website www.cra.wallonie.be

Walloon Agricultural Research Center | 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.



BIOLOGICAL SOIL FERTILITY: POTENTIALLY MINERALISABLE NITROGEN

THE IDENTIFICATION AND MANAGEMENT OF SOIL FERTILITY ARE CRUCIAL ISSUES IN AGRICULTURE. HOW CAN WE DETERMINE THE ABILITY OF THE SOIL TO PROVIDE NUTRIENTS FOR PLANTS, AND ESPECIALLY NITROGEN WHICH IS ESSENTIAL TO GROWTH?



If in conventional agriculture it is easy to cover a lack of nitrogen supply from the soil by applying mineral fertilisers, the aim in organic farming and other low input systems is to meet the needs of the crops by maximising the supply from the soil. In these systems inputs are organic: farm manure (slurry, raw or composted manure,...), crop residues, plant cover crops (catch crops, intercrop cover crops, intercropping, decomposition of stable organic matter - "humus",...).

The conversion of organic nitrogen into mineral nitrogen is a microbial process involving aerobic bacteria (nitrobacter, nitrosomonas...), known as nitrification. There are several methods used to measure the potentially mineralisable nitrogen in soils, including those based on laboratory incubation. This is widely used on soils, and also to study the release of nitrogen by organic matter supplied to the soil. At the CRA-W, it has been used to describe and manage soil fertility in organic farming (BIO2020), and also for other projects (Soilveg, Bioecosys). However, these laboratory measurements only provide a theoretical indication of nitrogen soil fertility.

The originality of the approach is that it compares these laboratory measurements with field monitoring of the mineral nitrogen found in the soil profile horizons, in bare soil parcels, parcels with crops (cereals, vegetables), and a transposition to the field. This is based on a close correlation between nitrification rate and soil temperature. This approach makes it

possible to convert the number of incubation days in the laboratory into an equivalent number of days under field conditions, and thus to predict the dynamics of nitrogen release in the field over the agricultural season. For this purpose, our work is based on daily medians of soil temperature calculated over a 20-year period in reference meteorological stations, which are representative of the various bioclimatic regions of Wallonia.

Processing of all cumulative data will make it possible to fine-tune this transposition of laboratory measurements to the field, in our crop systems and our pedoclimatic conditions.



Bernard Godden
b.godden@cra.wallonie.be



WHAT IF CATTLE ENABLED FARMERS TO MAKE USE OF RESOURCES THAT ARE NONEDIBLE FOR HUMANS...?



IN A CHANGING GLOBAL CONTEXT, BEEF PRODUCTION IS BEING INCREASINGLY CRITICISED AND THREATENED. IN RESPONSE TO THIS CRITICISM, THE SUSTAINBEEF PROJECT AIMS TO DRAW ATTENTION TO THE FACT THAT RUMINANTS, ESPECIALLY CATTLE, CAN MAKE IT POSSIBLE FOR FARMERS TO UTILISE PRODUCTS THAT ARE NOT EDIBLE BY HUMANS, FOR EXAMPLE GRASS AND BY-PRODUCTS OF THE FOOD INDUSTRY.

The SUSTAINBEEF project is a European venture supported by the ERANET SusAn programme, which brings together partners from Germany, France, Ireland, Italy and Belgium. It seeks to assess the sustainability of beef production systems that optimise the utilisation of resources (Feed) that are not intended for human consumption (Food). To achieve this, livestock farms typical of the differing European regions have been modelled using the FARM-DYN tool. This tool, developed by German partners, models the choices of agricultural practices that farmers can implement with the aim of economic optimisation. To obtain an overall picture of the sustainability of exploitation, other environmental and social aspects are also assessed. Four typical farming systems have been defined for Wallonia: extensive breeder system, intensive breeder system, a breeder-fattener system, and finally a dairy system carrying out terminal crossbreeding on part of its herd.

About twenty cross-border innovations aimed at limiting the competition between animal feed and human food were identified. These fall into 5 categories: the management of grass and fodder, the replacement of concentrates by other less competitive forms, the selection of breeds or animals, precision farming and the reorganisation of farming systems. These innovations were then shared out and discussed in focus groups made up of farmers, technical-economic advisers and interested parties in the beef industry. The objective of this exercise was twofold: to compile a list of innovations in the scientific literature and to identify the incentives and disincentives for implementation of the innovations that were considered the most relevant, but also the least achievable in the current context within our farming systems and the industry.

The next stage in the project will be to implement the case studies and innovations



within the model and cross-reference them all to identify possible ways of evolving our farming systems.

For further info: <http://www.cra.wallonie.be/fr/sustainbeef>

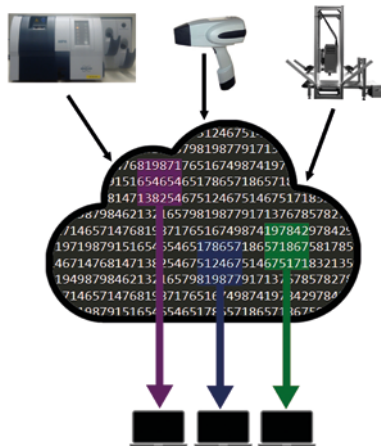


Sylvain Hennart
s.hennart@cra.wallonie.be



LOCAL BASED CHEMOMETRIC METHODS AS A SOLUTION FOR THE “BIG NIR DATA”

NEAR-INFRARED (NIR) SPECTROSCOPY HAS BEEN WIDELY USED IN MANY FIELDS BECAUSE OF ITS SPEED, NON-DESTRUCTIVE APPROACH, ENVIRONMENTAL FRIENDLINESS AND SIMPLICITY. NIR SPECTRA ARE MORE AND MORE INCLUDED IN THE KNOWN “BIG DATA” WORLD DUE TO NEW AND MORE ACCESSIBLE NIR TECHNOLOGY.



New improvements include the use of portable instruments allowing collecting data out of the lab as well as imaging systems that allows collecting even larger quantity of data. The objective is to use such large NIR datasets in a faster and effective way and directly on-line through a web cloud of potential users. The challenge here is how to give a fast and precise prediction service using the cloud and protecting the raw data at the same time. At the CRA-W, in collaboration with several foreign institutes, different “local-based” chemometric tools applied to NIR data have been proposed to speed-up modeling and predicting processes (Local Partial Least Squares – LPLS - and Local Partial Least Squares using Scores – LPLS-S). These “local-based” approaches have been tested on real data sets and compared with the classical global PLS method. The studies concerned the quantification of characteristic quality parameters in corn seeds and the prediction of the total β -carotene content of cassava roots.

In all cases, these strategies showed to be an efficient alternative to optimize predictions, when compared to classical global models. The results showed that local approaches could solve the non-linearity problem and at the same time they have permitted a drastically reduction of the calculation time without losing prediction accuracy.

These methods permit, not only to obtain quantitative predictions with improved performance compared to classical regression methods, but also to extend the prediction to more than one product from a unique and large data set. This means that the spectral library can be multi-products, which can also drive to the development of unique predictions with consequent savings in time and effort required to develop and maintain individual calibration models. Last, but not least, the proposed methods work, not with the original NIR spectra but with a compressed data, allowing then a protection of the raw data.



Juan Antonio Fernández Pierna, j.fernandez@cra.wallonie.be

ORGANISATION OF WORK ON FARMS IN WALLONIA, WHAT'S NEW?

PRESSURE OF WORK IS A SIGNIFICANT FACTOR IN WALLONIA FARMS.



Credit : ONIEL / C.Helsly

Thirty percent of farmers feel an urgent need to improve the way they organise their work, and forty five percent should ideally change their work methods.

Problem areas in the organisation of work in farming concern:

- (1) the complexity of regulation and administration
- (2) the pursuit of free time.

Farmers who diversify by providing accommodation, transforming their products or establishing educational farms face similar difficulties. Moreover, diversified farmers sometimes experience competition between the various activities taking place on the farm.

In response to the work pressure highlighted, a network of advisers specialised in work organisation has been created. It comprises 6 technicians belonging to Walloon agricultural agencies. To acquire the necessary skills, training that alternates theory and practice has been provided by two French institutions working in partnership with the CRA-W. By the end of 2017, around twenty farmers had enjoyed the benefits of labour consultancy. Inappropriate herd sizes in relation to the workforce, inefficient daily journeys within the farm (eg poorly located silos), working on multiple sites, or lack of communication between different workers are all factors with a negative impact on work organisation.

Various tools have been developed to help farmers manage their workload. Among these are a good practice guide to administrative management, a set of «hints and tips», a work diagnostic for «work» advisers and a directory of resource personnel to guide farmers successfully towards the most skilled discussion partner for each particular topic. The CRA-W is still working on this issue by producing work time references in agricultural diversification and cattle breeding.

OTEL project, funded by Wallonia.



Amélie Turtot, a.turtot@cra.wallonie.be



CANKER STAIN ON PLANE TREES: PREVENTION IS BETTER THAN CURE!

ON 3 DECEMBER ABOUT FIFTY ARBORISTS AND AVENUE TREE SURGEONS GATHERED AT THE CRA-W FOR AN AFTERNOON OF INFORMATION ON THE THEME "THE PLANE TREE, HEALTH PROBLEMS OF TODAY AND TOMORROW".



The participants learned from the experience of consultant arborist Francis Maire on how to manage canker stain that affects plane trees in the south of France. This disease is native to North America and is caused by the vascular pathogenic fungus *Ceratocystis platani*. It was introduced into Europe at the end of the Second World War, and is now responsible for extensive damage in various European countries including Italy, Switzerland or

Greece. Occurrence of the disease in France led to the felling of several thousand plane trees along the Canal du Midi. The infection of plane trees with *C. platani* initially causes the formation of discrete necrosis in the bark of the trunk and branches. As a result of vascular tissue dysfunction, the fungus can then cause abrupt drying of the branches. The use of contaminated tools plays a significant part in spreading the disease.

As part of the FUNGIFOR project, the CRA-W monitored canker stain of plane trees in Belgium in collaboration with the PCS (Proefcentrum voor Sierteelt). *C. platani* was not detected in any of the 78 sites visited in 2016 and 2017. A risk analysis of the introduction of this pathogenic fungus into Belgium was also carried out as part of the project. This shows that the risk of introduction is mainly associated with pruning operations on our plane trees, often carried out by private companies that also operate in countries already affected by the disease. It also highlights a risk that is all

the more significant considering that the specifications issued by our cities and towns do not normally include obligations relating to the disinfection of pruning tools.

The afternoon of information therefore provided an opportunity for a debate on good practices in preventing the introduction of canker stain in Belgium. The need for vigilance in order to detect a potential infection as soon as possible was also stressed.

If suspicious symptoms are observed, the CRA-W Consultation Desk can be contacted to arrange an analysis specifically targeting *C. platani*. A leaflet describing the symptoms and biology of this pathogenic fungus, along with guidance for collecting samples, is available on request.

FUNGIFOR project: funded by SPF Public Health, Food Chain and Environment Safety.

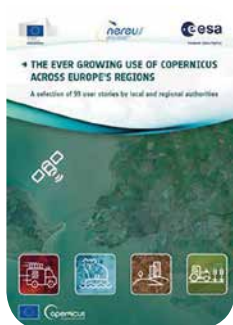


Sophie Schmitz
s.schmitz@cra.wallonie.be



WALLONIA AND THE CRA-W, A LITTLE CLOSER TO THE STARS...

TWO CRA-W RESEARCH PROJECTS ARE IN THE MAINSTREAM OF THE COPERNICUS PROGRAMME: SAGRIWASENT AND BELCAM.



Twenty years after its inception, the Copernicus European space programme has become the world's leading provider of earth observation data. This ambitious programme, a symbol of European unity, provides a vast number of images free of charge. It has enormous potential for improving the daily lives of European citizens.

Keen to promote this wonderful but often little-known tool, the Network of European Regions Using Space Technologies (NEREUS), working in collaboration with the European Commission and the European Space Agency (ESA), published a compendium in November 2018 ("The evergrowing use of Copernicus across Europe's Regions"). This contains no fewer than 99 illustrations of the use of this data by public authorities (NEREUS et al., 2018).

With 3 illustrations, Wallonia is certainly positioned as a leading player in this field. And the CRA-W, which is involved in 2 of these illustrations, must not be overlooked!

The first example forms part of the SAGRIWASENT project. The aim is to enhance the use of images from constellations of the SENTINEL satellites of the Copernicus programme in the conversion of the declaration control system set up by the Walloon paying agency (OPW) into a monitoring and support system for farmers.

The second example, based on the same type of data, describes the setting up of a collaborative platform within the framework of the BELCAM project. This is intended as an aid to both farmers and management services in the optimal management of nitrogen supply in field crops.

The SAGRIWASENT project is funded by the SPW, convention D31-1368X. The BELCAM project is funded by the Belgian science policy (BELSPO), convention SR/00/300.



Viviane Planchon
v.planchon@cra.wallonie.be



ANNUAL REPORT 2016-2017-2018



You can now find our Annual Report on our website
<http://www.cra.wallonie.be/en/activity-report>

Or upon request at:
communication@cra.wallonie.be