



CHANGE OF PARADIGM IN IMPROVING FRUIT SPECIES TO ADAPT BETTER TO ORGANIC AGRICULTURE

INNOBREED A EUROPEAN COLLABORATIVE RESEARCH NETWORK FOR THE CREATION OF NEW FRUIT VARIETIES FOR MORE ROBUST AND DISEASE-TOLERANT ORGANIC AGRICULTURE.



European organic fruit production is very dependent on natural inputs because the varieties grown currently come from so-called 'traditional' improvement programmes. These varieties are not therefore generally suited to an organic production system.

To enable the development of alternative and more sustainable organic production systems, there's a clear need to create new improvement programmes whose objectives are to select varieties:

- (1) with a genetic basis that is significantly more diverse (promoting the use of regional genetic resources);
- (2) more robust with a better capacity to adapt to biotic and abiotic stresses (including the climate);
- (3) more tolerant to pests and diseases and
- (4) with differentiated taste and nutritional qualities.

Within this framework, the 'Innovative Organic fruit Breeding and uses' project – **InnoBreed** (2022-2026) aims to define new common bases to create improvement programmes and testing networks specifically dedicated to organic production. It aims to promote and unite existing 'Innovative Solutions' which are focused on the participative selection in organic production of fruit varieties from a broad range of species (apple, pear, peach, apricot, plum, almond, cherry and citrus).

InnoBreed groups 21 research teams and organisations that are active in selecting and enhancing fruit varieties for organic production. Thanks to its expertise in

participative selection in organic agriculture, the CRA-W has been one of the initiators of this new adventure and will contribute to various initiatives. In this way, the CRA-W is involved in:

- managing the project via participation in the 'Project Manager Board';
- analysing the current situation with the identification of innovative European initiatives, current socio-technical gaps and needs in terms of organic fruit production;
- identifying innovative solutions in the fields of selection methods, technological tools, genetics resources and social/non-technological solutions in terms of organic production;
- using regional genetic resources as generators;
- developing and validating rapid methods to determine fruit quality for a more efficient selection (hand-held NIR);
- direct promotion or valorization ? in organic production of local varieties from our fruit genetic resources.

Thanks to its European collaborative network, **InnoBreed**, will enable to move forward in our research work in the field of selection and participative and innovative development with a focus on the organic local production of fruit, especially apples and pears.

More information:

www.cra.wallonie.be/fr/innobreed

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BEST MONITORING OF AGRICULTURE PLOTS BY SATELLITE

The BELCAM platform provides new products from satellite information to improve the management of agricultural plots.

Launched officially in August 2019, the BELCAM platform offers free access to various products and services essentially from satellite imagery, with a view to improving the economic and environmental performance of farms. Its products and services independent from all commercial purposes have been developed by UCLouvain and the CRA-W in partnership with farmers and extension services (pilot and technical centres). They enable the farmer or breeder to monitor the growth and development of its winter wheat, corn, potato and pasture plots throughout the growth season and help them take decisions in particular relating to the management of nitrogen inputs and risk management. The products available include the prediction of the nitrogen balance and the development of the nitrogen status during the season, the changes in foliar development (through the LAI) and the possibility in this way of comparing the growth of a plot in comparison to its neighbours or an estimate of the final yield. The platform also enables to display the meteorological data from the CRA-W's [Agromet platform](#) for each of these plots.

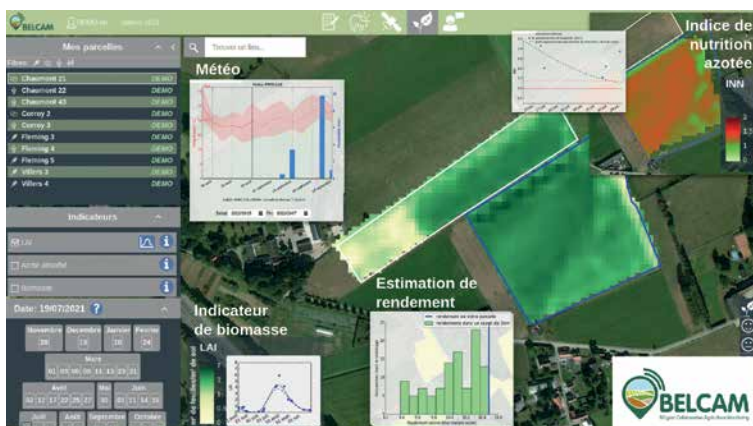
The platform is scalable and new products are regularly added, such as a nitrogen nutrition index (NNI) in potatoes. Soon, a product enabling the characterisation of plot heterogeneity and a nitrogen nutrition index in pastures will also be available. All the products proposed are also constantly improved. Field campaigns are regularly organised to refine algorithms with a view to ensuring their applicability irrespective of the growth conditions. Product improvement also involves interactions with users. In this way, beyond basic products judged as robust, the platform doesn't hesitate to submit products in a test phase whose reliability remains to be confirmed, in particular thanks to the close interaction with users.

The BELCAM agricultural council platform is therefore part of responsible agricultural that takes care to reduce the use of inputs (nitrogen mainly) as well their negative impact on the environment (for example the pollution of groundwater). For this, it is based on the new generation of European high spatial and temporal resolution satellites (Sentinel) enabling a characterisation on a plot and even intra-plot scale. It also presents the benefit of offering scalable products meeting farmers' expectations that are adapted to Walloon conditions.

More information: www.belcam.info or contact@belcam.info

Partnership: The platform's implementation would not have been possible without the help of farmers and the partner supervisory services (FIWAP, CIPF, CePICOP, CARAH, VEGEMAR, PCA, INAGRO, Hooibeekhoeve, LCG) not to mention the non-profit organisation REQUASUD.

Funding: Developed initially within the framework of a STEREO III project funded by BELSPO (partners: UCLouvain, CRA-W, VITO and ULg-Arlon), since October 2019, the BELCAM platform exclusively managed and improved by a partnership between UCLouvain and CRA-W.



CONSOLIDATION OF THE SUSTAINABLE NATURE OF BELGIAN BLUE WHITE BREEDING

How do we sustainably reduce methane emissions in the beef production? This is what the Blanc Bleu Vert project explores.



This project is part of the Greendal objectives through a consortium between scientific partners and private companies.

Sustainable development and the reduction of greenhouse gases are a priority for European countries. One of the Greendal objectives for Belgium consists of reducing the production of greenhouse gases (GHGs) by 35% by 2030, in the agricultural sector.

This is becoming a decisive factor in a company's commercial viability: inevitably, companies in the primary sector must anticipate this change and develop products that are likely to meet this demand to keep a competitive advantage as well as to offer access to new markets.

The objective of the Blanc Bleu Vert consortium is to enable two Walloon companies to develop a commercial policy surrounding sustainability. For Dumoulin, this is focused on a range of sustainable food and for Inovéo, it aims at a racial characterisation of the Belgian Blue White based on environmental criteria.

The CRA-W and ULIège are the two scientific partners of this four-year project. They will provide their expertise, in particular in the implementation of indirect, rapid and inexpensive measurements of the sustainability criteria which are enteric methane emissions and ingestion. It will therefore be possible to initiate the bases of a genetic evaluation with a view, over the long term, to guide selection towards more efficient and lower-GHG-emitting animals (both in terms of Belgian Blue White pure breed and crossing between beef and dairy breeds).

Cross-breeding is part of the WWF's recommendations to meet the growing demand for meat and minimise the environmental impact of its production. The project will therefore help achieve the Greendal's objectives.

More information: www.cra.wallonie.be/fr/blanc-bleu-vert

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SUNSHINE – THE BENCHMARK WALLOON OBSERVATORY OF GRASS GROWTH

The SUNSHINE project's aim is to set up the benchmark Walloon observatory for grass growth. This gives breeders optimised management of their pastures and cattle rationing through a decision-making tool.

Accounting for around half the agricultural land in Wallonia, pastures play a major role in Walloon agriculture. Optimising the management of grassy land is one of the key principles that improves the resilience of farms through greater food and protein autonomy. Grazing plays a predominant role, as grass is the most suitable food for cows, and is the close connection with animal well-being, the quality of the foods produced (milk/meat) and the provision of ecosystem services. Providing optimal grazing for one's herd requires a good technique and constant adjustment between the supply of grass and the animal's demand. This may be complicated in the context of climate change, where the occurrence of extreme climate events (e.g. drought, floods) is constantly growing.

The SUNSHINE project aims to provide a solution, combining growth models and satellite information, which enables us to estimate and predict grass growth in the short term, both in terms of quantity and quality. To develop such tools we need to rely on a large dataset that is representative of the growth and management conditions in Wallonia.



In 2022, no fewer than 16 farms and 56 plots spread over the main production areas were monitored. Using connected herbometers, measurements of compressed grass height were taken on a weekly basis while the biomass and quality of the grass were estimated on a monthly basis. The first results are encouraging. In this way, for example, the satellite images confirmed the absence of growth in many reasons following the summer drought and enabled us to estimate the grass growth over a restricted dataset with an average error of around 1.5cm.

A second intensive campaign is planned in 2023. These estimates of grass growth (quantity/quality) will be incorporated in a

decision-making tool providing computerised management of grazing calendars, and, via coordination with existing tools, optimised rationing of grazing.

Gaining a good understanding of breeders' needs and expectations is vital in defining a decision-making tool of this type. This will be developed in an 'agile' manner by maximising interactions with end users (breeders as well the various supporting organisations) at each important stage of its development.

More information:

www.cra.wallonie.be/fr/sunshine

Partnership:

The SUNSHINE project is carried out in partnership with Fourrages Mieux, Elevéo and UCLouvain.

Funding:

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IMPLEMENTATION OF A EUROPEAN NETWORK TO SUPPORT THE INTEGRITY OF THE FOOD CHAIN



These days, the food industry increasingly needs to provide information on its products and inspect them. This need aims to satisfy quality standards, as well as protect products against food fraud.

Historically, producers have underestimated the value and under-exploited the data acquired internally and in particular via their quality assurance programme. Recent technological developments coupled with the effective analysis of data provide the opportunity for gradual and decisive changes. The recent activities include the development of non-destructive spectral sensors or NDSSs combined with data analysis offers credible solutions for the first time, providing high added value that can be implemented in a broad range of food industries.

The scientific literature addressing the food applications of NDSSs is flourishing. Nevertheless, currently, there's a deep gap between this scientific literature and the actual implementation of these NDSSs within the European Union food industry. Furthermore, note that the growing complexity of food supply chains and the growing pressure on raw materials have multiplied the occurrence of food fraud.

Food crises have come one after the other over the years, such as horse meat, melamine or fipronil. Confidence in the agri-food industry, the supervisory authorities and political decision-makers has been damaged and it's essential to take measures to restore it.

The COST SENSORFINT initiative aims to help strengthen confidence in the European agri-food industry and is based on four themes:

- Using NDSSs as an innovation to strengthen process quality control in the European food industry,
- Implementation of solutions related to the integration of several signals from different NDSS to solve critical problems,
- Development of new mathematical algorithms and real-time methods for processing NDSS signals,

- Use of ICTs (Information and Communication Technologies) in the construction of decision-making tools based on the industrial implementation of NDSSs.

Know-how in the use of optical sensors, management of databases and the merging of data, as well as its knowledge in the authentication of agricultural products makes CRA-W a special partner in the development of analytical solutions on site for product control.

More information:

www.sensorfint.eu

Funding:

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WHAT MIXED CROP/LIVESTOCK SYSTEMS AND AGRO-ECOLOGICAL PRACTICES IN RESPONSE TO LOCAL AND GLOBAL CHALLENGES?

Combining animal and plant production must allow a certain degree of food sovereignty in a world with limited resources while reducing the impact of our food system on the climate. This was the hypothesis tested in the SPOT project.

The global population has just exceeded the eight billion thresholds. Covering the food needs with intensifying pressure on the environment is a sizeable challenge. It is necessary to specify the position that livestock farming systems must play in our agri-food systems. Livestock is often singled out for blame due to (1) its competition with humans, in terms of food resources use and therefore cropped land use, (2) its contribution to greenhouse gas emissions and methane in particular, (3) its nitrogen emissions, etc.

Nevertheless, in a world with limited resources, livestock can play a key role in maintaining the

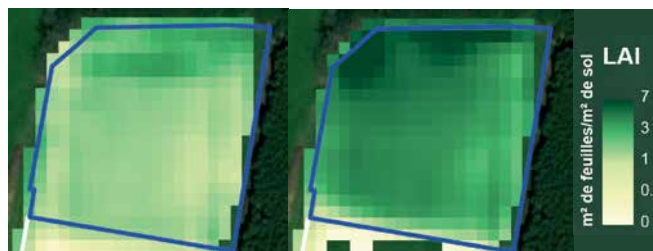
fertility of cultivated soils. A solution would be the implementation of a more circular economy with the enhancement of crop co-products valorisation and as a result, a better closure of nutrient cycles. Livestock also contribute to the transfer of nutrients from areas that are not conducive to crops (permanent pastures necessarily) to crop areas. This role is vital in organic agriculture where the nitrogen deficit is a real obstacle to crop production.

In this context, SPOT aims to explore the relevance of mixed crop/livestock combination to achieve climate neutrality and maximise food production for humans. This approach will

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Analysis of plots heterogeneity to take it into account when implementing contrasting systems.

take into account the expectations of major socio-economic actors of Centre-Ardenne, an area that is mainly focused on breeding beef cattle, and of the European Green Deal. Two mixed crop-livestock systems are implemented and followed up. One of them incorporates 70% permanent pastures and 30% cash crops while the opposite proportions are applied in the second. The rotation over six years of cash crops

involves potato, vegetables, two cereal-protein crop associations, spelt and rapeseed. A discussion is led at the same time, with the stakeholders in the Centre-Ardenne region and the agri-food sectors to support the valorisation of these productions.

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THE WHEAT – SPRING PROTEIN PEAS ASSOCIATION IN ORGANIC AGRICULTURE

Focus on the preliminary results of the influence of the mineral nitrogen soil content and the density of seedlings on the performance of this association.

The legumes are key elements in low-input crop systems, among others through their capacity to fix the atmospheric nitrogen and produce seeds that are rich in protein. The species associated with the legume enables better competition over weeds or plays the role of a tutor, improving the legume's growth environment. The association of crops, via the niche complementarity of associated species, therefore enables to optimise the use of the resources available with improved stability of protein crop yields or the protein content of the associated cereal as known advantages.

The CRA-W carried out an organic agriculture trial in Ciney for two seasons (2019 and 2020), by associating LENNOX, a spring wheat variety, with BAGOO, a variety of

spring protein pea, directly sown in a mix, with different densities of seedling for the protein crop. The aim was to assess the influence of the **mineral nitrogen content in the soil** coming out of winter and the pea density for the performance of the association.

The dry matter yields were quantified post-harvest and the performance of the different methods was assessed using the LER (Land Equivalent Ratio) calculation, defined as the relative land needed to produce the same yields as a pure and associated crop, showing the effectiveness of the association to an extent.

The **preliminary results** of this trial seem to confirm those observed in the literature and emphasise a

benefit in sowing spring protein peas in association in a context of low nitrogen residues. Symbiotic fixing can only fully be expressed when the nitrogen availability in the tilled layer is lower than a threshold of 56 kg N/ha. Under these conditions, the cereal is less competitive towards the legume. The complementarity of associated species for the use of resources is then maximised.

Furthermore, a greater seedling density of protein crop only seems beneficial when the nitrogen credit is low. This advantage tends to be non-existent when it is higher.

It does nevertheless seem necessary to confirm these first results and refine them, among others, by characterising the impact of the



nitrogen credit coming out of the winter on the association's quality performance.

Plus d'informations :
www.cra.wallonie.be/fr/association-froment-pois-proteagineux

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