



WILL WE SEE WEEDING ROBOTS IN THE FIELDS?

THE CRA-W EVALUATES THE POSSIBILITIES OF ROBOTISATION AND AUTOMATION OF MECHANICAL WEED CONTROL. ARE THESE TECHNOLOGIES MATURE AND SUITABLE FOR VEGETABLE FARMING IN WALLONIA?

The control of weeds is a major issue in plant production, all the more important in organic vegetable farming where weeding is mechanical, time-consuming and sometimes manual. The availability of labour is low and its cost high, so mechanical weeding faces a financial brake.

The appearance on the market of weeding robots, mechanical and autonomous, would do away with the use of herbicides and reduce the workforce for arduous tasks.

Weeding robots are already on the market, but their growth remains limited due to many obstacles such as the high price, efficiency, reliability, adaptability to Walloon territory or

even the lack of experience feedback.

The objective of the project is to answer the sector's questions.

In order to promote these new technologies, it is therefore necessary to first study, evaluate and validate them under regional conditions. The second step will be to disseminate the results obtained, arrange demonstrations and finally, make these tools available to farmers/vegetable farmers in order to build their ownership step by step.

For the moment, the tests aim to evaluate the performance of autonomy, movement, efficiency and flexibility of the robots (slope, camber, brightness, cultivation, etc.). They are carried out at CRA-W (in vegetable farming and field crops), but also at pioneer farmers associated with the project. A socio-economic assessment will also be carried out taking into account





investment and operating costs, ergonomics, arduous work, etc.

Ultimately, the objective is to take stock of the maturity of these technologies as well as an identity card for the robots in order to advise farmers according to their needs.

More information 

www.cra.wallonie.be/fr/robot-desherbeur

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SENSORS SERVING SUGAR BEET HEALTH

FOR THE BEETPHEN PROJECT, VARIOUS SENSORS WERE TESTED BY CRA-W AND VITO, BOTH ON THE GROUND AND IN THE AIR, ON THE TRIALS INOCULATED AND SET UP BY SES-VANDERHAVE, IN ORDER TO ASSESS THE SUSCEPTIBILITY TO POWDERY MILDEW OF SUGAR BEET VARIETIES.



The assessment of stress associated with a disease such as powdery mildew is conventionally carried out by experts specially trained for this task. They make visual observations using a rating scale to identify and quantify the presence of the disease. This type of assessment can be time-consuming and requires repeating observations throughout the growing season. This assessment is also highly dependent on human interpretation and can be influenced by weather conditions.

A first step towards more objective and efficient phenotyping is to perform measurements on the ground using portable

fluorimetry and spectroscopy instruments. The fluorimeter provides measurements of chlorophyll fluorescence which can detect factors that affect photosynthetic activity. These measurements can reveal the presence of powdery mildew before symptoms appear to the naked eye. The spectrometer provides reflectance measurements in visible and near-infrared wavelength ranges that can detect variations in leaf colour and composition. The models developed on these spectral data made it possible to define two groups of infection. Although having many advantages compared to the traditional method, these measurements on the ground still take a long time and depend on the conditions of access to the land. These measurements can, however, be performed with better accuracy in greenhouses where conditions are controlled, using these portable instruments or hyperspectral imaging cameras mounted on ground platforms. Using these technologies, 3 to 4 groups of powdery mildew susceptibility can be identified.

In order to further improve the efficiency of phenotyping, drones have been equipped with spectral sensors for the quantitative evaluation of foliar diseases in experimental

plots. This approach makes it possible to acquire information with a very high spatial resolution and a very flexible temporal resolution. In parallel with the multispectral approach, high-resolution hyperspectral remote sensing imagery was tested. This has been found to be more suitable for producing spectral indices related to crop health. It allows two groups of infection to be defined. Compared to the traditional method or to field measurements, image captures are faster and the measurements are more precise and homogeneous.

These new spectral phenotyping tools tested by researchers aim to bring new indicators into breeding programmes and help create the varieties of tomorrow that are more resistant to biotic stresses.

More information

www.youtube.com/watch?v=fqv5j0PQ2IU

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ON THE ROAD TO SUSTAINABLE DAIRY FARMING



THE R4D (RESILIENCE FOR DAIRY) PROJECT IS ONE OF THE MOST RECENT INITIATIVES SUPPORTED BY THE EUROPEAN UNION IN THE DAIRY CATTLE SECTOR.

Since January 2021, and for the next three years, 120 dairy farmers and 18 organisations, including CRA-W, from 15 European Union countries will cooperate under the leadership of the Institut de l'Elevage (IDELE) to contribute to the development of sustainable breeding, both socially, environmentally and economically.

The R4D project aims to strengthen links and increase exchanges between breeders, researchers and other players in the dairy sector in order to eventually implement innovative solutions adapted to the context of each dairy region. Three areas of expertise are particularly targeted, the socio-economic resilience of the system, technical efficiency and the development of production systems concerned with animal welfare, the environment and societal expectations.

The participants in the project, coming from different communities of stakeholders in the agricultural sector, will therefore contribute to identifying the most innovative and effective techniques for, for example, improving biodiversity or reducing the carbon footprint of livestock farming.

Farmers are strongly involved because each partner will rely on a few innovative pilot farms, and will regularly question its own network of actors in the dairy sector (pilot farms, consultancy organisations, dairies, etc.) to share knowledge and questions at the European level. The R4D project therefore offers dairy farmers the possibility of expressing and prioritising their needs, both locally and European-wide (bottom-up approach), and a relay via a variety of partners thanks to a system based on a «multi-actor» approach. Dairy farmers will have the opportunity to test in return ideas



or methods developed in other Member States and evaluate them. This dynamic of identifying and disseminating innovative practices adapted to the needs of breeders began this year in Wallonia through visits to farms.

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SATELLITES TO ASSESS THE NITROGEN STATUS OF POTATOES

SENTINEL-2 SATELLITE AND TEMPERATURE DATA ALLOW A GOOD ASSESSMENT OF THE NITROGEN STATUS OF THE POTATO CROP AT THE PLOT SCALE.

A good way to improve the management of nitrogen fertilisation in potato crops is to split the total nitrogen dose recommended at the start of the season, followed by an adaptation of the amount of nitrogen supplement to be added during vegetation development, by determining the nitrogen status of the crop. Sentinel-2 satellites, from the Copernicus programme, allow the use of free images with very interesting spatial (ten metres) and temporal (five days) resolutions to monitor nitrogen status at the plot scale. The STARGATE project tested the combined use of Sentinel-2 data and meteorological data (degree days) to assess this nitrogen status. More specifically, this assessment concerned biomass (tonnes of dry matter per hectare), nitrogen content (% nitrogen in plants), nitrogen absorbed (kg of nitrogen per hectare absorbed by plants) and finally the determination of the index of nitrogen nutrition (INN).

The results of the study demonstrate that these different parameters can be evaluated with good accuracy and are favourable to a methodology using biomass and absorbed nitrogen to determine the INN. Assessment of nitrogen content is therefore not necessary. This study forms the basis of a nitrogen recommendation tool at plot scale intended for farmers.

In practice, the farmer splits the nitrogen supply by applying 70% of a dose recommended at planting. During the development of the vegetation (between 20 and 50 days after emergence), the INN makes it possible to determine if the crop is nitrogen deficient, and, if it is, when it is necessary to apply the nitrogen supplement. Then the estimate of the nitrogen absorbed makes it possible to determine, on the basis of a target yield, the quantity of nitrogen to be supplied for a second application.



The study was based on data collected as part of the BELCAM project over 3 consecutive years (2017-2019). The developed methodology is being integrated on the BELCAM platform (<http://belcam.info/>).

More information www.cra.wallonie.be/en/belcam

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10 YEARS OF FRUITFUL COLLABORATION WITH CIPAC



CRA-W IS A KEY PLAYER IN THE INTERNATIONAL STANDARDISATION OF PESTICIDE ANALYSIS METHODS.

CIPAC, Collaborative International Pesticides Analytical Council, is an international non-governmental organisation whose goal is to promote the standardisation of methods of pesticide analysis and organisation of inter-laboratory programmes to evaluate these analysis methods.

Analysis methods are generally proposed to CIPAC by manufacturers of plant protection products and biocides or by scientific institutions, and are tested by laboratories around the world. Over the past 10 years, CRA-W has participated in more than 50 collaborative

studies, allowing standardisation of methods of analysis of active substances and their relevant impurities in technical and formulated pesticide products (herbicides, fungicides, growth regulators, nematicides, bactericides, etc.), as well as methods for determining the physical and chemical properties of pesticides. CRA-W has recently organised collaborative studies for innovative methods of analysis of pesticides for public health use. The results of collaborative studies are evaluated by CIPAC members before their adoption if the criteria of intra-laboratory repeatability and inter-laboratory reproducibility are met. The methods adopted are then published in manuals and on CD-ROM.

These CIPAC standardised analysis methods are used worldwide to develop FAO and WHO specifications for pesticides used in agriculture and public health, to carry out the physical and chemical studies necessary for product approval or to control quality of products placed on the market.

CRA-W has been closely associated with the activities of CIPAC since its creation in 1957. Olivier Pigeon, Scientific Director of

the Control Products and Residues Unit of CRA-W, has been a member of CIPAC since 2011 and represents Belgium among the 25 other members from different countries around the world. His predecessors were also members of CIPAC and even chaired it for several years. His colleague Marie Baes, Laboratory Manager, was recently elected CIPAC correspondent. CIPAC's annual meetings are also an opportunity for CRA-W researchers to present their work in the field of analysis of plant protection products and biocides.

More information <https://www.cra.wallonie.be/en/protection-control-products-and-residues-unit>



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PROTECOW - WHAT LESSONS AFTER 4 YEARS OF RESEARCH?

FOR 4 YEARS, THE FIVE PARTNERS OF THE INTERREG PROTECOW PROJECT HAVE POOLED THEIR EXPERIENCE TO ACHIEVE THE OBJECTIVE OF INCREASING NITROGEN EFFICIENCY IN DAIRY NUTRITION AND PROFITABILITY OF DAIRY FARMS.



What was the situation in the France-Flanders-Wallonia area?

Mainly of the mixed crop-livestock type with a high level of production, the dairy farms in the area have good levels of mass (66% in FL - 71% in FR) and protein (46% FL - 44% FR) autonomy. However, the comparison of dairy cows' diets in France and Flanders revealed differences in fodder strategy between the two regions. In Flanders, a point of attention is focused on earlier harvest of the grass silages allowing the purchase of protein concentrate to be reduced. In France, breeders rather take care to have a good energy and protein density in their diet in order to reduce the intake of production concentrates.

The strength of the group of breeders

During the 4 years of the project, the technical and economic results of a cross-border group of 18 dairy farmers were analysed and then shared during thematic meetings. The trio of breeders-advisers-scientists was a real driving force for change in the group.

The evolution of the technical and economic results of the PROTECOW farmers' club is a good example of this dynamic since between 2017 and 2020, the gross margin per 1000

litres for breeders increased by +24% (on average for FR and FL breeders) to +33% for WL farmers. This increase can be explained in particular by a rationalisation of the feed cost, via the combination of the levers "forage quality - reduction in concentrates intake".

The "PROTECOW dynamic" was also important in the group since the sharing of the results obtained from year to year made it possible to reduce the gap between dairy farmers. Thus, nearly €24,500 was saved, without reducing the volume of milk produced.

A PROTECOW dynamic shared by as many people as possible and long-term lessons

Advantage or not, the arrival of COVID-19 during the last year of the project forced the partners to review their strategies for communicating the results of the project. Thus, the closing conference of the project was replaced by a set of digital events. The results are positive since the various media have reached more than 190,000 people. The website www.interreg-protecow.eu reached nearly 35,000 people, the Facebook page has 530 "fans" and the YouTube channel, 196 subscribers. In terms of scientific communication, the PROTECOW results were presented in 2020 at the 3R congress in the form of



an oral communication, a poster and an EIT (Experience-Innovation-Field), and will be presented in 2021 at the annual conference of the EAAP (European Federation of Animal Science) in Davos.

More information

www.cra.wallonie.be/fr/protecow
www.interreg-protecow.eu



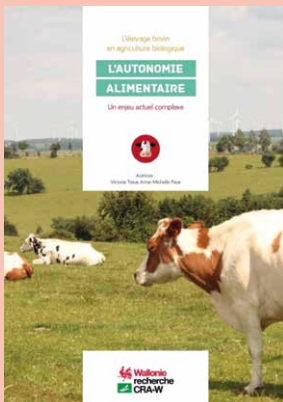
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NEW PUBLICATION



NEW BOOKLET:

Cattle breeding in organic agriculture: food autonomy



Supplementing the collection of booklets published on protein crops, pork and poultry in organic farming (OF), this new publication addresses a complex current subject: food autonomy in organic cattle farming.

This booklet aims to provide farmers with the levers that can be mobilised to improve the level of autonomy of cattle farms in OF. It is divided into four sections. The first establishes the legal context in which the Walloon organic cattle farming takes place and defines food autonomy. The second presents two major ways to improve the level of food autonomy of a cattle farm. The third section proposes how to draw up a food

profile of the farm. Finally, the fourth section provides a technical portrait of the autonomy of five farms.

Paper version available on request at celluleagribio@cra.wallonie.be

Downloadable free online
www.cra.wallonie.be/fr/levage-bovin-agriculture-biologique-lautonomie-alimentaire

