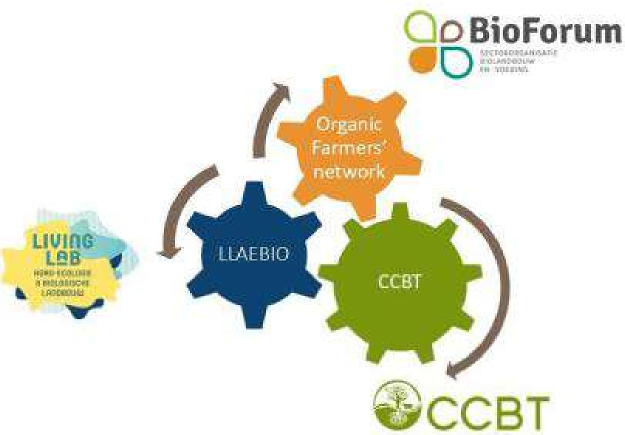
"Stronger together: Researchers from Wallonia and Flanders join hands for organic farming"

Tuesday 25 March 2025
Gembloux

Poster presentations during lunch time

The FORK network:
The Flemish Organic Research and Knowledge network



Context

The FORK-network is a platform for organic farming research and knowledge exchange, connecting previously fragmented actors into a strong and collaborative network. The network consists of CCBT, LLAEBIO, and BBN, working together to support organic farming in Flanders.

Objectives

The network aims to optimize knowledge exchange, stakeholder interaction, and the development of research matching with the demands of organic farming stakeholders. Co-creative research and tailored knowledge dissemination are at the core of its approach.

Methodology

- ***Participatory knowledge exchange***: *Farmers, researchers, and advisors collaborate, with farmers taking an active role in defining research needs.*
- ***Need-based research***: *Research topics are developed based on real farming challenges, leading to small-scale practical projects and longer-term applied and fundamental research.*
- ***Tailored information and dissemination***: *Research findings are shared through reports, newsletters, conferences, workshops, and the BioKennis.org platform.*

System approach

Low — High

Results and perspectives

By strengthening collaboration, multidisciplinary expertise and avoiding duplication in efforts, the FORK network is fostering innovation, is making knowledge more accessible and is enhancing research impact.

Future challenges are:

- *expanding (inter)national cooperation,*
- *securing resources for continued research and development,*
- *strengthening research in organic livestock production,*
- *bringing system thinking in Flemish research projects.*

Impact

Low — High

Interaction with organic actors

Low — High

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PLAN BIO 2030

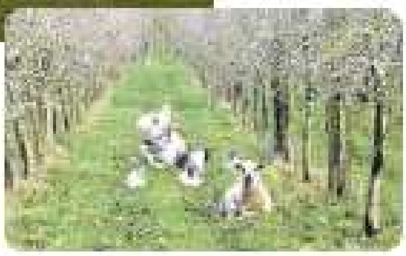
Towards More Resilient Organic Fruit Orchards

Context

Fruit tree cultivars used in organic farming exhibit low genetic diversity and are typically not bred specifically for organic cultivation. As a result, they are often poorly adapted to organic farming systems and show relatively low to moderate tolerance to major diseases and abiotic stresses, necessitating substantial phytosanitary support. Moreover, climate change is exacerbating these challenges, with prolonged droughts, heatwaves, and intense rainfall increasing stress on fruit trees. Unlike annual crops, fruit trees accumulate stress over the years, making them more vulnerable to diseases and pests, which can ultimately lead to tree mortality.

Objectives

- To support organic fruit producers by selecting robust varieties with greater tolerance to major diseases and increased resilience to stresses related to climate change.
- To evaluate and promote innovative, well-adapted farming practices that enhance the resilience of organic farming systems.



Methodology

- ✓ Evaluation of genetic resources, breeding populations, and cultivars using common descriptors for selected traits relevant to the organic sector (INNOBREED project).
- ✓ Participatory breeding and exchange of genetic resources.
- ✓ Study of 10 apple and 3 pear rootstocks better suited for organic farming.
- ✓ Evaluation of over 125 apple and 50 pear varieties. Participatory research in collaboration with organic producer organizations NOVAFRUITS & GAWI.
- ✓ Participatory agroforestry trials with vegetable growers and orchard meadows integrating poultry, sheep, and cattle.

System approach

Low High

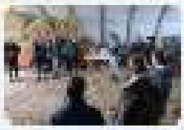
Results and perspectives

- ✓ Establishment of a European Network for Organic Participatory Breeding.
- ✓ Harmonization of descriptors and protocols, with a focus on prioritizing the most relevant traits.
- ✓ Initial rootstock results reveal differences in growth, flowering time, and resistance to pests such as the apple rosy aphid.
- ✓ The organic apple variety Ducasse, developed by CRA-W, is increasingly being planted.
- ✓ Development of a network of stakeholders engaged in participatory approaches.

Impact

Low High

Interaction with organic actors



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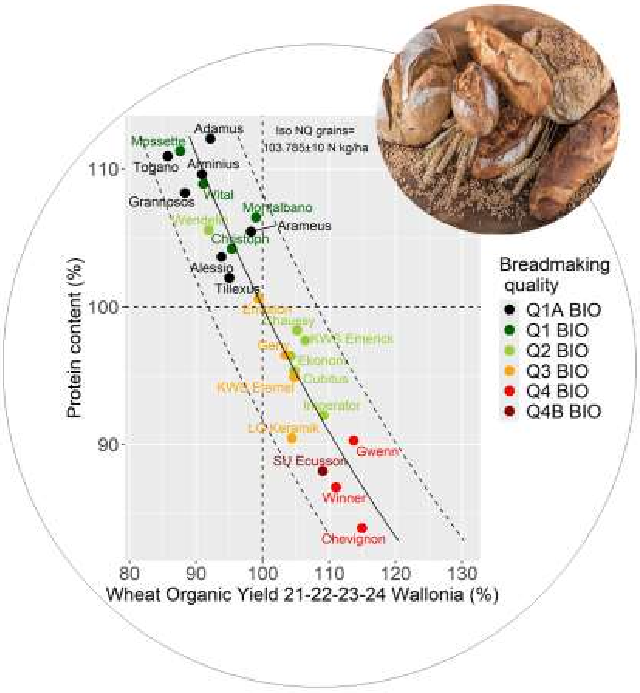
GAWI InnOBreed NOVA FRUITS Wallonie recherche CRA-W BIO AGENTSCHAP LANDBOUW & ZEEVISSERIJ LIVING LAB BioForum ILVO CCBT

Technological quality of food organic cereals: Varietal choice and Nitrogen fertilization



Context

The characterization of the technological quality of food grains is essential to ensure the technical feasibility of their use in processing methods.
The choice of variety determines the final product and the possible manufacturing process.

Objectives

Evaluate and rank the processing suitability of technologically robust varieties and nitrogen fertilization specific to organic food applications, and Walloon pedoclimate
Varietal choice: Wheat, Spelt, Barley, Durum, Oat
Varietal mix and population

Methodology

Agronomic trial:
- 3 variety sites (Condroz, Hainaut, Hesbaye)
- 1 nitrogen fertilization site (Wheat, Durum)

Technological analysis:
- Alveograph, Mixolab+, Damaged starch, Flour color, Hagberg, Zeleny, TW, TKW, Cylinder and Stone milling

Enhance evaluation with breadmaking and cookies test

Technological communication to the sector:
- Livre Blanc Céréales, Biowallonie, CePICOP, SoCoPro and technical events

System approach

Low — High

Results and perspectives

Recommend yearly from the technological point of view specific organic robust food varieties to anticipate their replacement because of the short commercial lifespan and low availability of their seeds in Belgium.

Recommend an organic nitrogen fertilization strategy specific to breadmaking wheat and durum.

Improve technological quality with our visible and infrared single kernel sorting device (QSorter).

Impact

Low — High

Interaction with organic actors

Low — High

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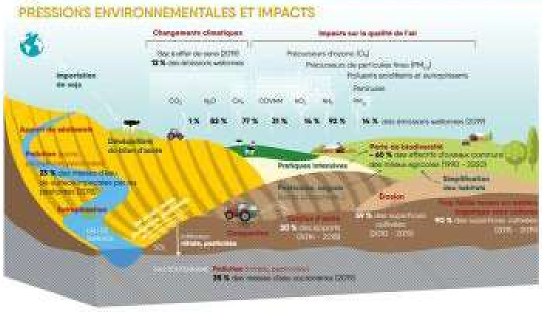
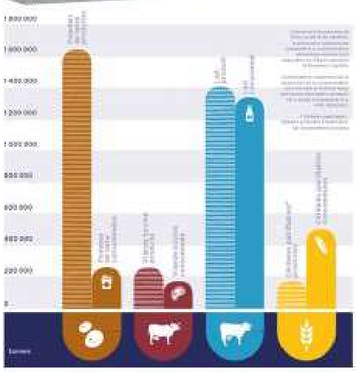
FOOD AUTONOMY IN WALLONIA
Towards sustainable diets and farming systems through land use optimization





Context

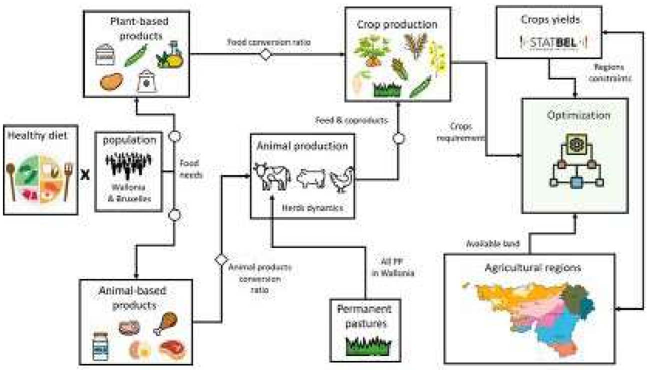
Agriculture in Belgium is predominantly agro-industrial, leading to negative environmental externalities. The agricultural market is also highly globalized, with a strong reliance on imports and exports, resulting in a significant mismatch between local agricultural production and consumer consumption.

Objectives

The aim of this study was to assess whether it is possible to feed the inhabitants of Wallonia and Brussels by optimizing land allocation across different agricultural regions in Wallonia. This analysis was conducted using various dietary patterns, different levels of food waste, and assumptions of both 100% conventional and 100% organic farming.

Methodology

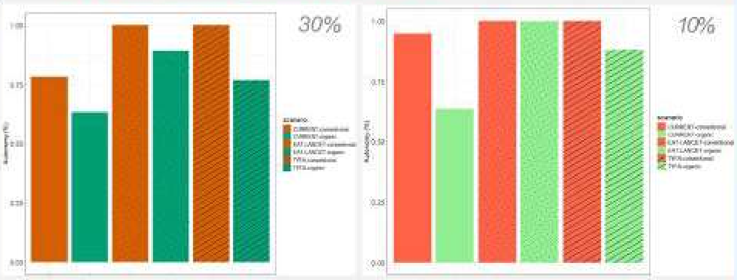
- *Optimize land allocation in agricultural regions to align food production with consumption.*
- *3 diets : current – TYFA – EAT-Lancet*
- *Food waste : 30% – 10 %*
- *Farming system : full conventional – full organic*



System approach

Low High

Results and perspectives



- Feeding Wallonia and Brussels with current dietary habits is not feasible under current practices.
- Full food autonomy is achievable if the population adopts alternative diets.
- Reducing food waste from 30% to 10% is crucial for achieving food autonomy in an organic farming scenario.

Impact

Low High

Interaction with organic actors

Low High

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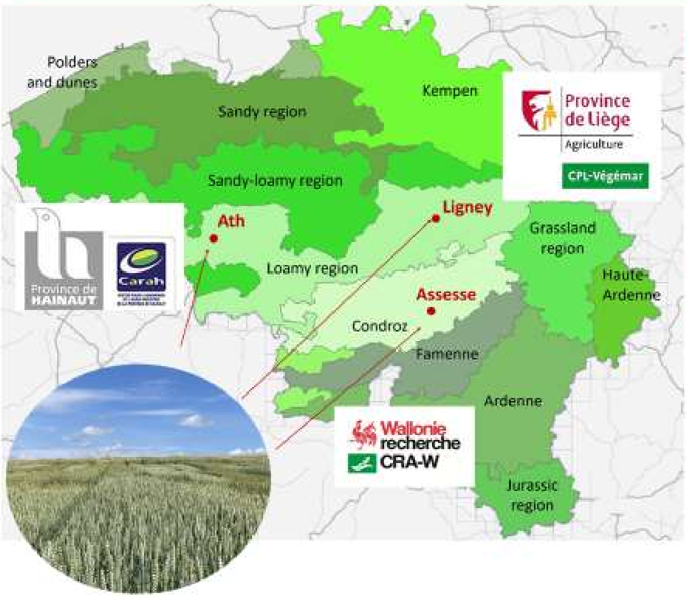
PLAN BIO 2030

Recommending varieties of cereals to farmers based on a network of field trials



Context

In organic farming, choosing the right variety is essential to control the development of diseases and to secure the harvest in terms of both quantity and quality.

Objectives

Support farmers in their choice of winter cereal varieties

- Determining the **agronomic and technological performances** of winter cereal varieties under organic growing conditions
- Assessment of the performances of **variety mixtures** and **farm-saved seeds** in wheat and of **CCP's** in wheat and spelt (CRA-W only)

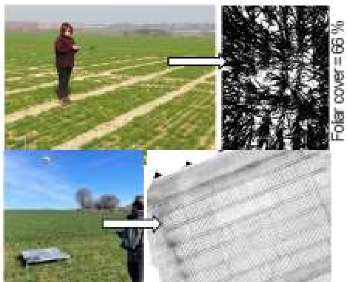
Methodology

→ 3 trial sites managed by the CARAH, the CPL-Végémar and the CRA-W, respectively.

→ ~ 70 pure varieties from 4 species: bread wheat, durum wheat, spelt and triticale.

→ The following traits are characterized:

- Plant growth and development: tillering habit, covering power, heading time, height at heading



NDVI values computed from multispectral images of the trial platform

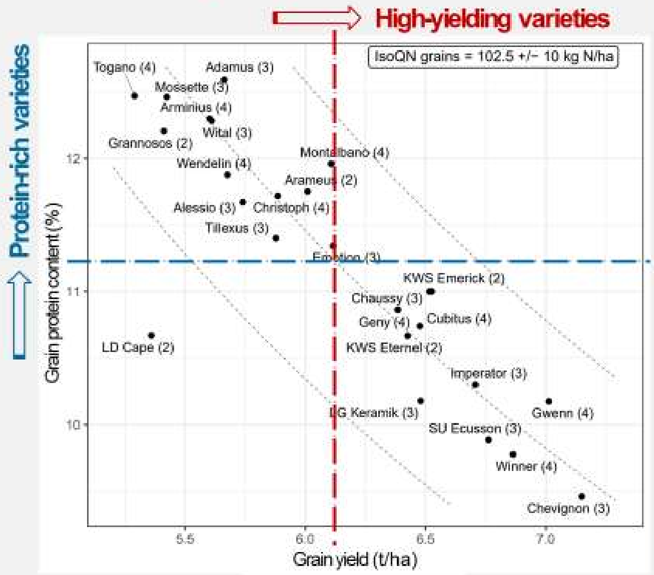
is defined as the ability of a crop to cover the soil and thereby, to compete with weeds.

Determined by image analysis.

- Tolerance to biotic and abiotic stresses: cold resistance, tolerance to leaf diseases, tolerance to lodging
- Grain production: grain yield, hectoliter weight, TKW
- Grain quality: Hagberg falling number, Protein content, Zeleny index

Low — System approach — High

Results and perspectives



Next steps

- Integrating additional cereal species (e.g., oat)
- Going further in the evaluation of varietal mixtures
- Adding trial sites in other agroecological regions ?

Low — Impact — High

Interaction with organic actors

Low — High

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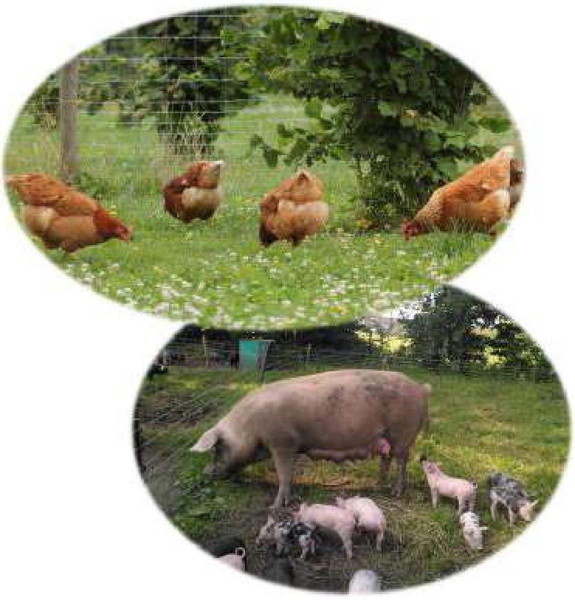
PLAN BIO 2030

BIO-UITLOOP: Valorisation of the outdoors for organic pig and poultry production systems



Context

Organic production systems have outdoor space, where animals can express natural behavior. This space provides nutrients, depending on intake, composition, management and season. However, its contribution to overall nutrient intake is yet unknown.

Objectives

- Get insights in the nutritional value of the outdoors
- What is the importance of the nutrient uptake from the outdoors for the organic production of pigs and poultry

Methodology

- Variation in nutritional value from the outdoors will be assessed,
- Variation in nutrient uptake by the animals from the outdoors will also be assessed.
- Factors that play a role in this variation will be taken into account:
    - type of outdoors and its management
    - Season
    - animal category
- Commercial farms will be involved and followed-up during this project

System approach

Low High

Perspectives

Insights obtained during this project will help in the valorization and use optimalisation of the outdoors within the pig and poultry organic production systems.

Nutritionists will have insight in the nutrient uptake from the outdoors and will be able to formulate feed that take the latter into account.

Impact

Low High

Interaction with organic actors

Low High

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Wallonie service public SPW

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Stronger together : Researchers from Wallonia & Flanders join hands for organic farming (25 March 2025, Gembloux)

SolAB
Appel RPB 2024
(D65-1461)

Wallonie Relance

Soil management in organic farming : How to optimize soil ecosystem services in Wallonia, Belgium ? SolAB

Context

- 60 to 70 % of EU soils are degraded (Veerman et al. 2020)
- The main threats on agricultural soils in Wallonia

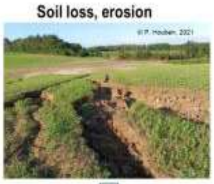
Biodiversity loss

Quantify the benefits of OA on soil biota, multifunctionality of OA

Soil organic matter loss

How to increase SOM in OA, climate resilience of organic farms

Soil loss, erosion



Reduction of soil tillage in OA to decrease erosion risks

Study sites

Field trials

SYCBIO (n=9) — « ABC » Network (n=18)

- Control *vs* innovative cropping system
- Available phytotechnical & soil data
- Field repetition/paired design

Farm network

Fields (n=40) → Arable cropping (vegetables, Cereals); Cropping & livestock (TG <<, TG >>)

- Gradient of intensivity
- Collection of phytotechnical data
- Multicriteria analysis

Goals

- To identify agronomic factors controlling soil quality in organic farming systems and provide OA-specific references and recommendations
- To test agricultural practices with a high level of economic risk (OA without full inversion tillage) for farmers to test their technical feasibility in walloon organic farms and benefits for soil quality

Soil quality measurement

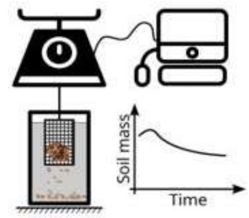
Soil monitoring and resilience Law (COM/2023/416) defines **soil health** based on « a good **physical, chemical and biological** state, allowing soil to provide continually and as much as possible **ecosystem services**»

Biomass production	Climate regulation	Water cycle regulation	Biodiversity habitat
Nutrients, acidity, ...	Soil organic matter, carbon	Soil structure, porosity	Abundance, activity & diversity of microorganisms

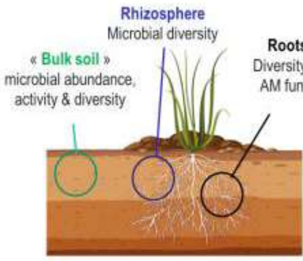
- Mesures:
  - C, N organic
  - Texture
  - pH
  - Available nutrients(Ca, K, Mg, P)
  - Labile C ($KMnO_4$ 0.02 M)
- Calculs:
  - C stocks
  - Corg/Clay ratio
  - Clabile/Corg ratio

No-till: 0-30 cm, BD = 1400 kg/m³ → decompaction → Full inversion tillage: BD = 1200 kg/m³, 0-30 cm

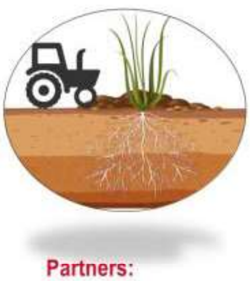
- Calculation of C stocks based on fixed depth may introduce a bias (-15 % under FIT)
- Comparison on an equivalent soil mass (**« ESM » method) allows an unbiased comparison between FIT and no-till or reduced tillage**



Soil structural stability measurement by the QuantiSlake Test method, Vanwindekens & Hardy (2023)



A multidisciplinary team



Farm network
CRA-W, Biowallonie

Agricultural practices
CRA-W, Biowallonie

Soilstructure
CRA-W

Microbial abundance, activity and diversity
ULiège

AM fungi diversity
UCLouvain

Chemical fertility & C stocks
CRA-W

Partners:

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CALONNE-SALMON, M. & DECLERCK, S. (UCLouvain)

Agricultural practices

Quantitative/categorical indicators of agricultural practices

Soil cover

- Soil cover
- Living soil cover
- Mulch cover
- Cumulated period of bare soil

Plant diversity

- Crop diversity
- Total plant diversity
- Intensive crops
- Winter/spring crops

OM inputs

- Mandatory crop residues
- Optional restitutions
- Exogenous organic matter

Mecanical disturbance

- STIR (Soil Tillage Intensity Rating)
- Area impacted by traffic
- Plowing frequency
- Plowing depth

Wallonie recherche CRA-W
Centre wallon de Recherches agronomiques
Répondre aux questions d'aujourd'hui et relever les défis de demain
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BIOWALLONIE
LIÈGE université Gembloux Agro-Bio Tech
AGRO LOUVAIN BIOINGENIEURS

Monitoring Biodiversity in Agricultural Areas Flanders

Context

The agricultural area is losing its biodiversity. With MBAG, we keep our finger on the pulse and evaluate the results of nature-oriented efforts. Alo for agriculture itself biodiversity in the agricultural area is of great importance.

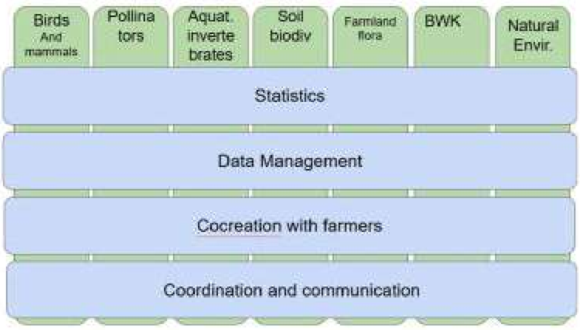
Objectives

The monitoring system focuses on (European and regional) reporting obligations and knowledge dissemination on biodiversity.

	Birds and mammals	Pollina tors	Aquat. inverte brates	Soil biodiv	BVM + farmland flora	Natural Envir.
Nature Resto -ration law	Agriculture Birds	Pollinators Grassland Butterflies			Elements high div	
LULUCF Regulation					Ecosystem change	
CAP	Agriculture Birds	Species HD			Elements high div	
Proposal Soil monitoring directive				Soil biodiv		
Proposal directive Ecosystem Cal.	Agriculture Birds	Pollinators			Ecosystem surface	
HD + BD + PAS + KRW	Agriculture Birds Habitat D.	Agriculture species HD	Water quality agriculture		Agriculture habitats species	Ground water Surfacewater Soil

Methodology

MBAG is made up of several modules, which mutually interact, such as field birds, pollinators, soil biodiversity.



Results and perspectives

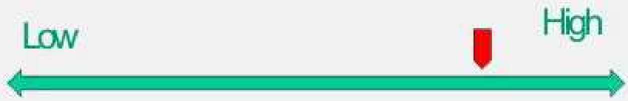
E.g. MBAG-MAS tracks breeding birds and fauna of the agricultural area. Volunteers and professionals count more than 1,450 points in Flanders every year.
The counting points are randomly distributed within the different agricultural regions in Flanders. Within the agricultural regions, a distinction is made between open and semi-open landscape (OL and HOL) and inside and outside species protection programme (SBP). This allows us to make both small-scale statements about these specific strata and larger-scale statements about the agricultural region and Flanders as a whole.

Cocreation with farmers

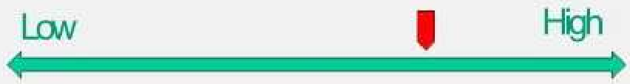
We share and discuss the results with farmers. We look for opportunities to involve farmers in the monitoring network, e.g. identify invertebrates via pitfall traps, moths via Led Buckets,…

System approach

Impact



Interaction with organic actors



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Brochure

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Towards more circularity in crop livestock systems: design and first learnings from the SPoT project

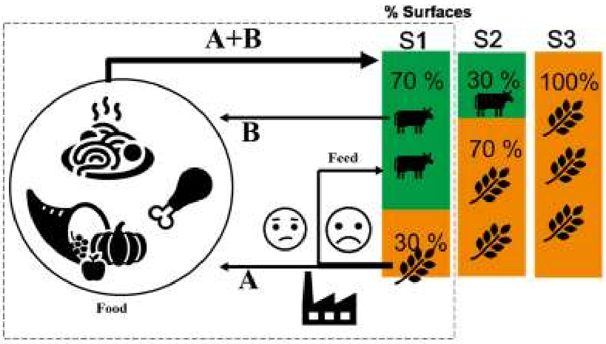

Figure 1 : Experimental systems are designed to maximize food production and are limited in inputs. They must be similar in N, P, and K to food production. The form of inputs is questioned to minimize the effects of mining elsewhere in the food system (other farms) or in nature (mineral mining).

Context

The environmental burden of agriculture is partly related to nutrient losses. Mixed and integrated crop-livestock systems are raised as potential solutions to reduce nutrient losses to the environment.

Objectives

Within the SPoT project, we aim to question 3 types of mixed crop-livestock systems for their capcacity to minimize losses and their integration in nutrients recycling strategies in complete food production systems.

Methodology

Constrained systems in terms of nutrients inputs:

- Similar to the amount exported as food (figure1)
- From the anthroposphere or simulated so and avoiding of mining effect elsewhere in the food system.

Nutrients flows measurements and modelling.

Frequent exchanges with farmers regarding the ongoin experiment

System approach

Low High

Results and perspectives

- Limited amount and type of input available.

- Perceived barrier to implementing systems ("food waste", "why not buy straw elsewhere", etc.)

- Decision tools to be developped to minimize nutrients losses and manage organic matter.

Impact

Low High

Interaction with organic actors

Low High

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Groupe ABC,

Co-apprentissages d'Expérimentations Systèmes en Réseau de parcelles (ESR)

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Dispositif

Focus du groupe ABC*

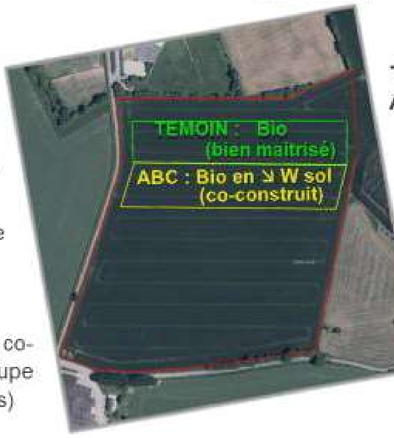
Réduction du travail du sol, en systèmes biologiques (notamment, non labour)

Objectifs de l'expérimentation

- **Ancré** dans la réalité de terrain
- **Exploratoire** d'un nouveau système
- **Systémique**
- **Long** terme

- **Co-apprentissage** par co-création, co-observations et co-réflexion, en groupe (agriculteurs, conseillers, chercheurs)

* Agriculture Biologique de Conservation des sols



Méthodologie

TEMOIN : itinéraire **classique** de l'agriculteur, **bien maitrisé**

ABC : système avec un objectif de **réduction de travail du sol**, mobilisant différentes **combinaisons de pratiques**, **adaptées** au contexte particulier de la parcelle

- **Suivi** (observations, mesures) des deux systèmes (productions, adventices, sol)
- **Bilan collectif** : comparaison des deux systèmes
  → compréhension, hypothèses, adaptations envisagées

Retours d'expériences et réflexions du groupe

GESTION MÉCANIQUE DES ADVENTICES

Principaux défis :
Chardons et graminées

Gestion du chardon

- Seuil de compensation : 6-8 feuilles

Scalpages

- Seuil d'intervention vs potentielles remises en germination
- Plusieurs passages
- Descendants (terre ferme)
- 1er scalpage au collet (min. de terre)

Rupture de densité

- Pas uniquement
  - en mauvaises conditions (lissages)
  - une question de semelle de labour

→ Anticiper avec test bèche avant semis

Ouvrir la « boite de Pandore » ?

- Quelles sont les adventices particulièrement problématiques sur cette parcelle ? Quelle période de désherbage éviter afin de ne pas provoquer leur germination ?

DESIGN

Cultures en bandes de semis

- Concurrence sur le rang
- Possibilité de binage

→ BioCoCrop : Prototype semoir + régulateur pour alternance de céréale – légumineuse en bandes

COUVERTS

Semis multi-espèces

- Gérer les modes de semis et types de semences

Post-moisson

→ Stratégie plusieurs scalpages
→ Stratégie couvert (l'implanter en avance)
Eviter les solutions intermédiaires

TECHNIQUES D'IMPLANTATION

Semis direct

- Absence de minéralisation (faim)
  → intérêt de la ferti localisée
- Anticiper la gestion de la concurrence du couvert par une combinaison de leviers

StripTill

- Intéressant lorsque défaut de structure 0-20 cm

StripTill vivant

- Complément de légumineuse + plante non gélive facilement destructible au printemps

Wallonie recherche CRA-W

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Répondre aux questions d'aujourd'hui et relever les défis de demain
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agroecology transect
Co-funded by the European Union
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Exploring the Potential of Forage Silage Rich in Protein as a Nutritional Source in Poultry Production

Parameter	Control	Experimental	SEM	P_Value
Initial weight (g)	1823.3	1749.6	28.1	0.06
Final weight (g)	1923	1781	29.2	0.002
Weight gain (g)	99	27	12.6	0.001
ADG (g/D)	4.75	1.48	0.64	0.001
Egg weight (g)	56.4	55.6	0.28	0.003
Feed Intake (g)	147.2	129.6	1.70	0.001
FCR	2.9	2.5	0.06	0.001
Laying rate (%)	90.5	92.9	1.05	0.13
Yolk color	7.62	10.4	0.16	0.001
ω-3 (PUFA)	3.41	4.6	0.12	0.001
ω-6/ (ω-3) ratio	7.31	5.36	0.38	0.001

Context

Alfalfa-based dehydrated silage pellets (ABSP) are available non-conventional source of protein and other nutrients in organic layer hen farming. They represent an option to be used as poultry feeds to overcome the problem of high cost of soybean meal and therefore contributing to reducing the costs of production.

Objectives

The objective of the present study was to replace part of a commercial diet with ABSP as an alternative source of ingredient and nutrients in the feed of organic laying hens.

Methodology

Trial carried out in Modave (Belgium), from January to March 2023;
40 Laying hens divided into two groups, and 4 sub-groups each, randomized block design;
T diet: 10% substitution of commercial feed with ABSP;
C diet: commercial organic feed;
Measurements: Daily egg weight and laying rate, weekly WG and overall FI and FCR, physico-chemical parameters measured after random selection of 3 eggs per box on day 7 and 21.

System approach

Low — High

Results and perspectives

ABSP had negligible or even positive impact on animal performance of organic hens and allowed the production of eggs with more pronounced color and increased PUFA content, probably owing to nutrient and metabolites characteristics of Alfalfa. Alfalfa-based silage pellet could enhance income for organic poultry farms. However, further research is needed to determine the feasibility of ABSP use in formulating broiler feed.

Impact

Low — High

Interaction with organic actors

Low — High

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Managing the chicory root aphid.

Context

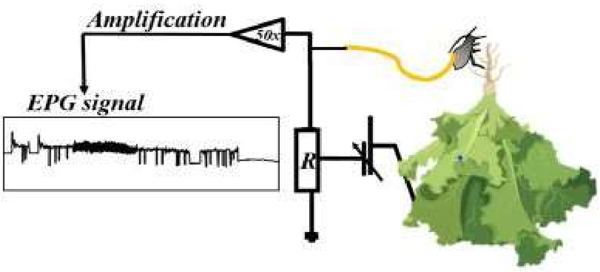
The lettuce root aphid *Pemphigus bursarius* is a serious pest of chicory (*Cichorium intybus*), causing economic losses in the Franco-Belgian basin. Climate change, with rising temperatures and drought, may impact aphid pressure on crops (Leybourne et al., 2021).

Objectives

As part of the INTERREG programme, this thesis project aims to increase our knowledge of the consequences of climate changes, on chicory-aphid interactions, to develop integrated strategies for the control of the lettuce root aphid.

Methodology

Analyze the **feeding behavior** of *P. bursarius* on **two chicory varieties (one susceptible and one potentially resistant)** to identify resistance factors. Compare with the resistance of aerial parts to *Myzus persicae* (polyphagous) and *Nasonovia ribisnigri* (oligophagous).



System approach

Low High

Results and perspectives

Our first results showed no effect of the chicory variety on the feeding behavior of *M. persicae*. However, *N. ribisnigri* took longer to reach the sap elements of the variety that is susceptible to the chicory root aphid. Future results about the feeding behavior of *P. bursarius* will verify the resistance of the chosen variety and help to understand the relationship between root resistance and leaf resistance. Our results will help providing new control solutions for producers.

Impact

Low High

Interaction with organic actors

Low High

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Interreg France - Wallonie - Vlaanderen REFLECHI

UMONS Université de Mons

Université de Picardie Jules Verne

inagro

FREDON

Les Producteurs d'endives de France

Soutiens financiers :

Reduced soil tillage in organic cropping system (ABC)

Collaboration group (farmers-researchers-advisors) carrying out on-farm (systemic and long-term) experimentations (Wallonia)

Group

Wallonie recherche CRA-W ↔ Greenotec

Objectives

Exploring a new system : **reducing tillage in organic systems (ploughing)**

Grounded in field reality → **Systemic**
→ **Long** term
→ **Flexible & coherent** exp. design

Co-learning through **co-creation, co-observation** and **co-reflection**, by benefitting from the **ideas, knowledge, skills** of the **group**

Context

*« **ABC** » doesn't asnwer to a immediate problematic, but to a **long term vision***

Diverse motivations :

- Enhance **soil fertility** (phys-chem-biol), and **crops resilience**
- Limit **weed germination**
- Reduce **costs** and **energy**, **time** or **organisation** on farm

Limiting technical elements faced in « ABC » :

- **Weed management** (grasses, perennial weeds)
- **Nitrogen availability** (poor mineralisation without soil tillage)

Methodology

*Control : **Classic** farmer's itinerary, well mastered.*
*ABC : System with the aim of **reducing tillage**, using different **combination of practices**, **adapted** to the specific context of the plot (**flexible**)*
***Follow up** of both systems (productions, weeds, soil)*
Collective assessment** : comparison of the two **systems
→ understanding, hypotheses, proposed adaptations

Reduced tillage (no-till)

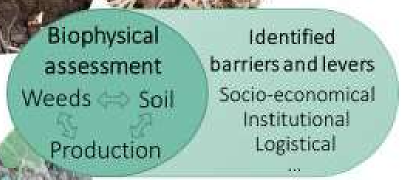
- *Reduced depth (shallow scalping, direct seeding, etc.)*
- *Reduced intensity (less animated tools and fewer passes)*
- *% area worked (strip-till, BioCoCrop, etc.)*

Fertilization

- *Localized*

Plant cover

- *Crop rotation (legumes, temporary grassland, etc.)*
- *Crops and/or varieties association*
- *Cover crops (diversification, sowing techniques, etc.)*



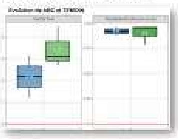
Results and perspectives

I.	Test the agronomical & technical limits	*Through experiences and collective discussions : identification of the keys to success, identification or hypothesization of the reasons for failure and attempt to forge group expertise (intervention -> conseq.)*
II.	Compare system trade-offs	*Compared biophysical (and economical) assessment of both systems (productions, weeds, soil)* *Plot's results + Multivariate & multicriteria analysis*
III.	Identify barriers for a viable system	*Identification of the barriers (social, economic, technical, logistical, etc.) the farm and this system encounters in order to be viable*

Grasses and perennial weeds management, poor mineralisation, density fracture with repeated same depth preparation, …

Effects and trade-offs of each system on different dimensions

Productions Low ← → High
Soil fertility Low ← → High
Weeds manag. Low ← → High



Lack of specific machinery, entrepreneurs availability and shared vision, ecosystem services valorisation, …

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agroecology transect
Co-funded by the European Union
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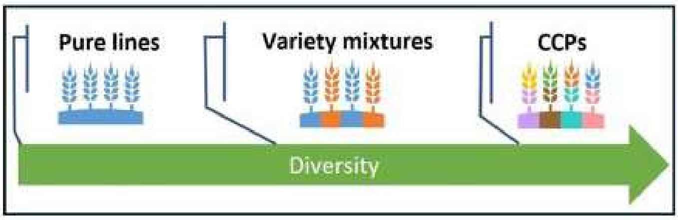
Organic Heterogeneous Material (OHM) :
Bread wheat and spelt Composite Cross Populations (CCP)

Context

Intraspecific diversity within the field can enhance crop resilience and adaptability through compensation and complementarity ecological mechanisms, and through population evolution over the course of generation under the effect of natural selection. Composite Cross Populations (CCP) are highly diverse populations that are created by bulking of the progeny of multiple crosses.



Objectives

We are developing and observing the performance of wheat and spelt CCPs designed for **organic farming** and **artisan breadmaking** in Belgium.

Methodology

1) **Participatory choice of parent varieties** based on phenotypic observations (soil cover, disease tolerance, yield, baking quality) while maximizing genetic diversity and diversity of origins.

2) Half-diallel crosses between all parents.

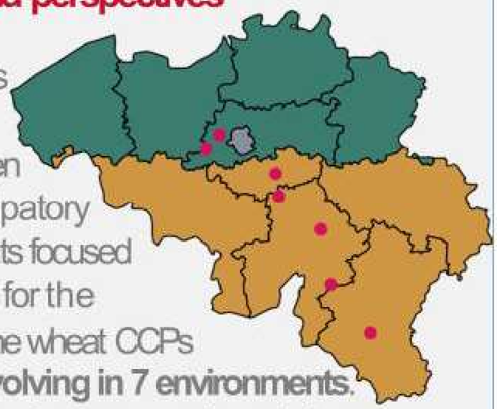
3) Constitution of founding populations by mixing the F3 generations.

4) Multiplication and **evolution in different environments** (different regions, **on-farm** and in experimental trials).

System approach

Low — High

Results and perspectives



Two spelt CCPs and two wheat CCPs have been created. Participatory choice of parents focused on old varieties for the wheat CCPs.The wheat CCPs are currently **evolving in 7 environments.** Observations (performance and evolution of diversity) are ongoing, along with the establishment of a **participatory breeding network** for further selection within the CCPs.

Impact

Low — High

Interaction with organic actors

Low — High

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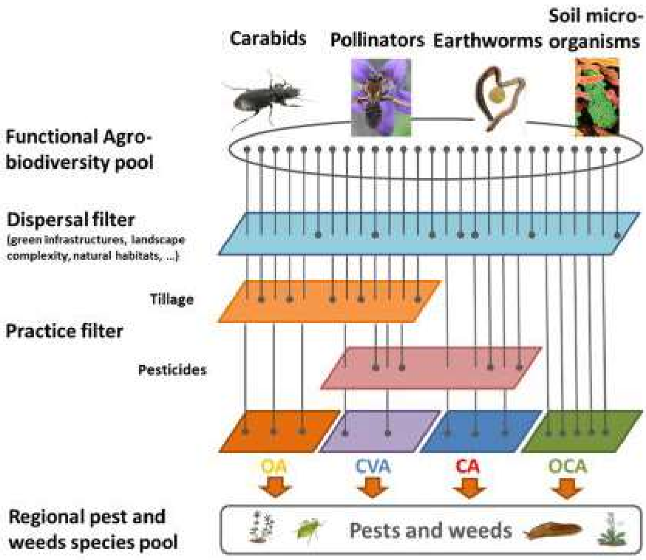
PLAN BIO 2030

FAB4Farming: Functional AgroBiodiversity for Farming



Context

Walloon Pesticide Reduction Programme III (PWRP)

A project in collaboration between ULB – Agroecology Lab (Prof. Thonar, Prof. Vereecken) and ULiege – Gembloux Agro-Bio Tech (Prof. Dufrêne, Dr. Boeraeve)

ULB ÉCOLE DE BIOINGÉNIERIE DE BRUXELLES

LIÈGE université Gembloux Agro-Bio Tech

Objectives

Highlight technical itineraries favoring both a reduction in PPPs and an increase in functional agro-biodiversity (FAB) to support the development of resilient and autonomous farming systems

Methodology

A network of 40 farms

- CVA = conventional agriculture
- OA = organic agriculture
- CA = conservation agriculture
- OCA = organic-conservation agri

→ Sampling FAB and pests and detailing technical itineraries in terms of practice gradients rather than broad farming categories

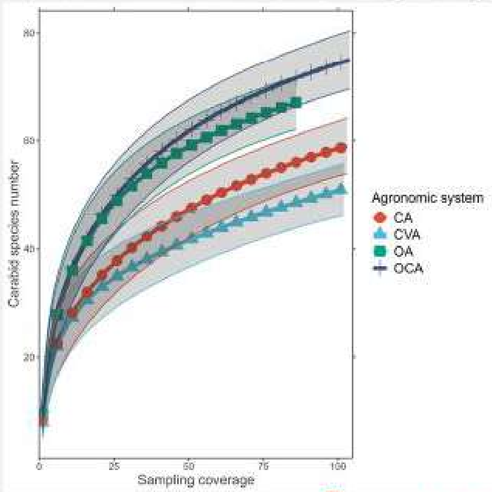
System approach

Low — High

Preliminary outcomes

A gradient appears in terms of FAB as follows: OCA>OA>CA>CVA

Further analyses ongoing to better hierarchize individual practices rather than farming categories



Impact

Low — High

Interaction with organic actors

Low — High

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Four cropping systems for vegetable production

a long term experiment

Context

The management of organic cropping system for vegetable production require the use of substantial imported fertilizers, but various European countries gradually ban the use of nutrients from conventional sources of organic matters in organic agriculture.

Objectives

The aim of the present study is to experiment, for two 6-years long rotations, innovative approaches of organic vegetable productions, designed to reduce the reliance on import of external resources.

On-farm-produced cut-and-carry alfalfa

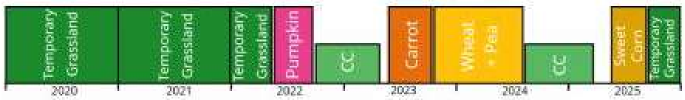
On-farm-produced ramial wood chips

Cover-crop : complex mixed species

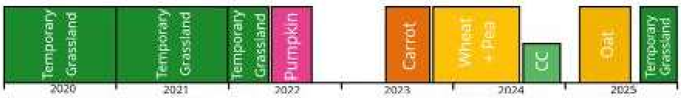
Methodology

The cropping systems were co-designed through a participatory process involving farmers, advisors & scientists. Four cropping systems including multiple fertility-building crops are implemented in Gembloux since 2020 under a split-plot experimental design. Through various approaches, cropping systems are relying on green manures, cover-crops or on-farm-produced cut-and-carry alfalfa and ramial wood chips (RWC) as their main source of soil fertility. The RWC come from a perennial willow short rotation coppice planted in Gembloux in 2020.

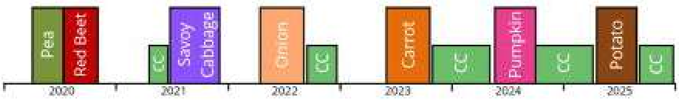
Cropping system 1 *: Multi-crop farming without livestock (only carbon import under ramial wood chips from willow trees / no ploughing)*



Cropping system 2 *: Self-fertility mixed farming with livestock (balanced animal manure / ploughing)*



Cropping system 3 *: Soil-conservation vegetable farming (carbon import from ramial wood chips and alfalfa imports, without animal manure / no ploughing)*

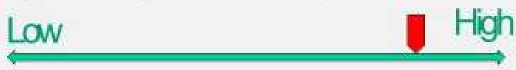


Cropping system 4 *: Standard organic vegetable farming (commercial organic fertiliser, animal manure / ploughing)*

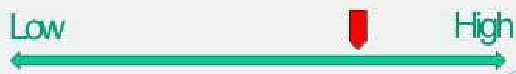
Results and perspectives

- While N can be naturally catch by leguminous crops, the experiment shows first sign of decrease for non-renewable K resource in low-input organic cropping systems in the top soil layers..
- Cropping systems with annual winter ploughing were easier to manage regarding weed control, refining seedbed, water management in spring, but decrease soil structural properties.
- Intensive tillage in vegetable cropping systems reduce soil biodiversity if vegetable cash crop are present each year.
- Nutrient management and soil quality could be improved in organic vegetable cropping systems by intensive use of fertility building crops, which also could reduce nitrogen losses to the environment. It requires a well-managed destruction of the fertility building crops in spring.
- Each cropping system should maintain the same objectives for the next six years such as carbon based for CS1, self-fertility for CS2, soil conservation for CS3, standard organic for CS4.

System approach & Impact



Interaction with organic actors



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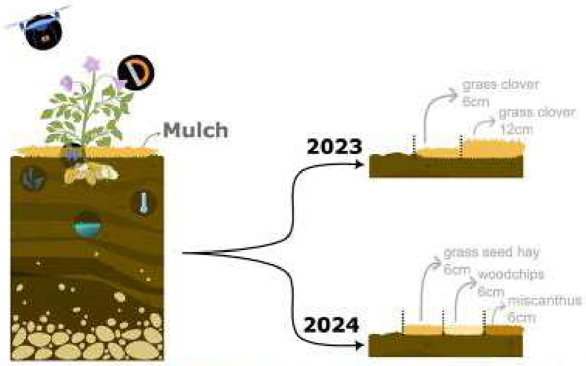
Even in a wet year, mulch can prove its usefulness



Mulching trials potatoe 2023 (left) & 2024 (right)
@ILVO, Melle, België, sandy loam

Context

Mulch can play an important role in climate adaptation by:

- buffering extreme temperatures
- improving infiltration of water into the soil
- preventing evaporation of soil moisture

Hence, soil and crops are more resistant to extreme weather conditions

Objectives

- Examining effect of different thicknesses/types of mulch on soil temperature, water and nutrient dynamics as well as on crop development and yield
- Close collaboration with farmers to identify common mulching practices and to investigate their impact under field conditions
- Synthesis report of common mulching practices including a SWOTanalysis

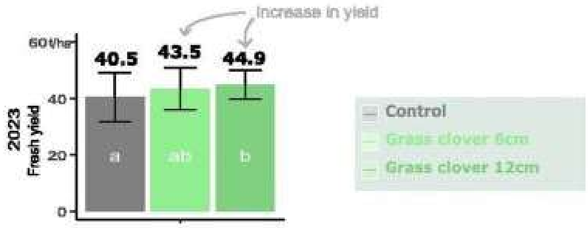
Results

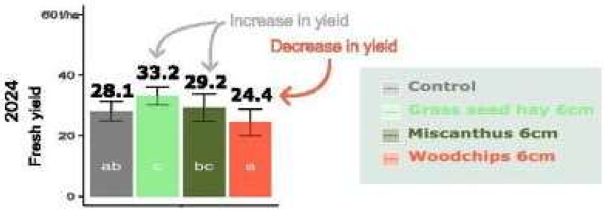
Mulching trial 2023

- More stable soil conditions in terms of temperature and soil moisture when mulch was applied allowed the crop to develop better in the early stages resulting higher yields

Mulching trial 2024

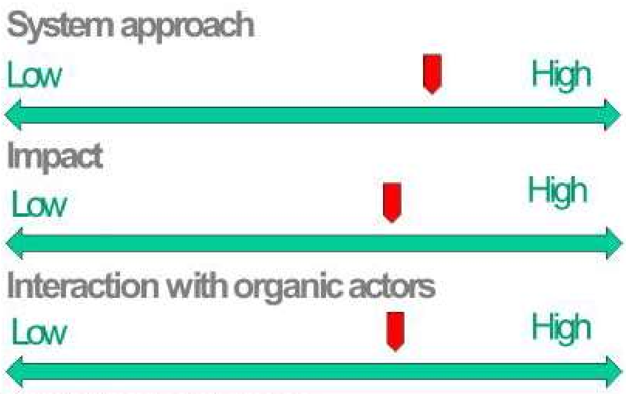
- Biodegradability of mulch type largely determined crop development & yield





Take home message

- Applying mulch is complex because it interacts with both the water and temperature balance and the nutrient dynamics of the soil
- Weather conditions play a major role in the effect, but in both a dry and wet year, mulch can prove its usefulness



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PLAN BIO 2030

Research of alternative methods for controlling pests and diseases in organic fruit orchards

Context

Increasingly stringent national and European legislation is reducing the range of solutions available to control pests and diseases in orchards. In addition, climate change and human activities are causing new pests to appear in our regions. These factors, plus society's growing desire for sustainable agricultural production, make it essential to find solutions that are more respectful of nature and the environment.

Objectives

CRA-W is working to find alternative methods to plant protection products against the main pests and diseases that growers face. The aim is to provide them with pragmatic solutions that can be applied in a professional, economically viable context.

Methodology

The CRA-W is thereforeinvolvedin different research projects on the following main themes:

- alternatives to copper,
- improvedcontrolof applescab (decision-support tools, monitoring, treatment strategy, …), zero-phyto control of pear gall midge, apple blossom weevil, codling moth, etc.
- adapting to climate change,
- enhancing functional biodiversity,
- Etc,

System approach

Low — High

Results and perspectives

- Testing of a sex pheromone for monitoring leek midge flights and confirmation of its reliability,
- Identification of biopesticide molecules with action against apple scab.
- Effectiveness of sticky white strips against apple sawfly.
- Positive effect of flower strips in the row spacing on auxiliary entomofauna.

Impact

Low — High

Interaction with organic actors

Low — High

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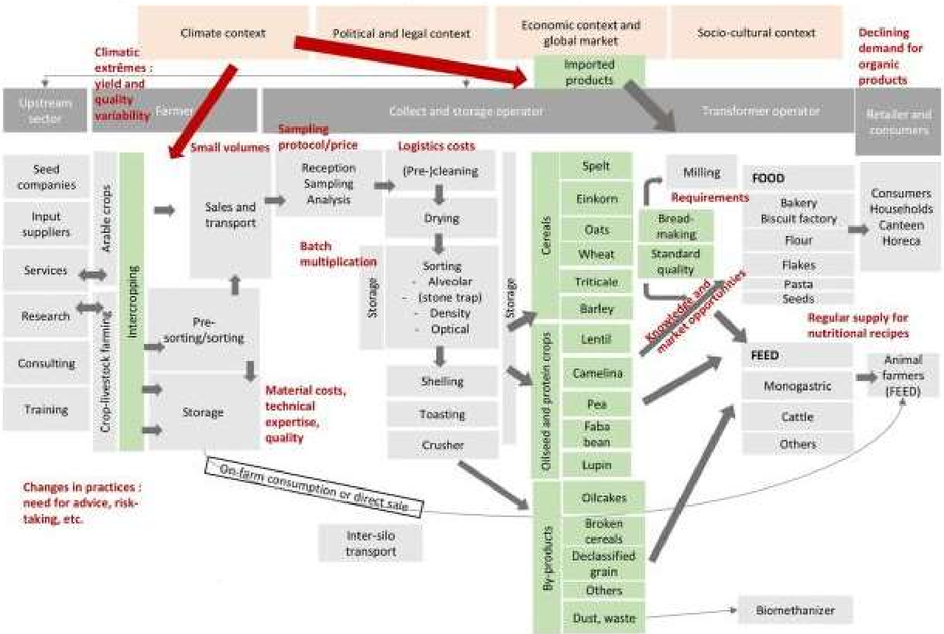
PLAN BIO 2030

Obstacles and opportunities to the development of protein intercrops sector

Cereal-legumes intercrops barriers (in red) faced by different value chain actors



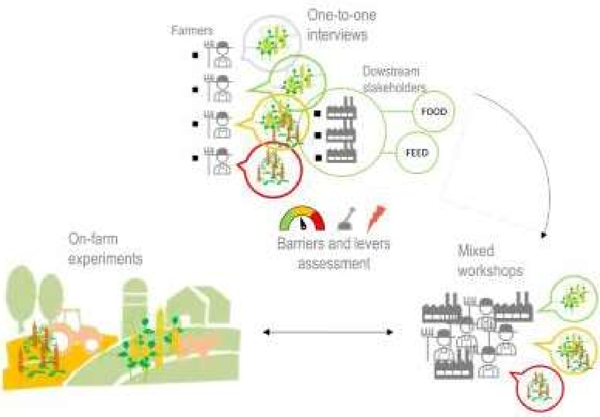
Context

Protein intercrops can meet the many challenges facing organic farming such as dependence on inputs, weeds control or protein self-sufficiency for example. Nevertheless, this agricultural technique is more complex to manage, both for the farmer (place in the rotation, technical itineraries) and for downstream operators (sorting, storage, distribution).

Objectives

AssoBIO research project is based on a participatory approach combining multi-stakeholder workshops and on-farm trials, with the aim of highlighting actionable knowledge and removing obstacles to the development of protein intercrops.

Methodology



System approach

Low — High

Results and perspectives

Ways of overcoming the barriers to the development of a sector for cereal-legume combination crops

Improved dialogue between farmers and downstream operators to understand and take account of each other's constraints

Varietal and species choices in the intercrop

Set up a standardized **sampling** protocol	• Towards a fairer remuneration • Increases storage capacity by grouping small batches together
Optimising **volumes**	• Lower logistics prices • Taking account of this type of crop in the supply chain (e.g. new feed formulation) • Choosing the most suitable and least expensive sorting method
More flexible **quality criteria**	• Test for acceptable residual organoleptic and technological value • Knowledge about varieties to limit the impact of anti-nutritional factors

Impact

Low — High

Interaction with organic actors

Low — High

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PLAN BIO 2030

Transdisciplinary exploration of organic dairy beef production based on grassland and by-products

Context

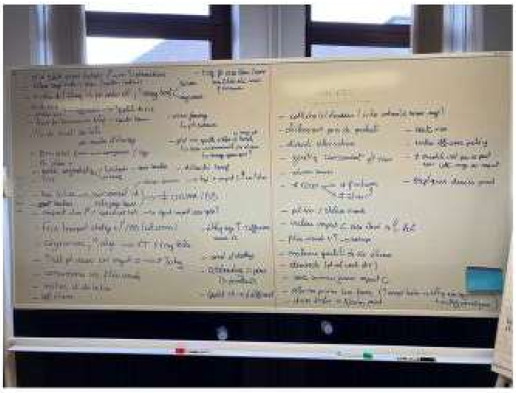
- Maximize food production
- Reduce environmental impact
- Close the loops: valorize grass and co-products, and produce manure

Objectives

- Provide reference zootechnical scheme for sustainable beef production from dairy herds
- Co-construct strategies to valorize products from these farms

Methodology

1. Study two systems where animals are fed with grass and by-products, based on the proportion of permanent pastures in each system. Ingestion (quality and quantity), meat production, methane emissions and the behavior are monitored.
2. Set up a group of farmers testing, on farm, different production and valorization schemes for dairy calves to beef. Co-construction of innovations, implementation and performance evaluation.
3. Co-construction of the image of products : study of the value chain and multi-stakeholder workshops.

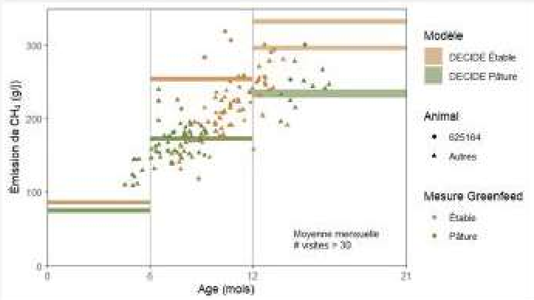


System approach

Low — High

Results and perspectives

- Initial results on performance and methane emissions from crossbred dairy-to-beef bulls valorizing only grass and by-products.



- Study of barriers and levers to the consumption and production of beef from dairy herds in Wallonia.
- Support the development of a beef production sector from dairy herds as an alternative to long supply chains.

Impact

Low — High

Interaction with organic actors

Low — High

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Undersowing cover crops in vegetables

Context

Cover crops play a crucial role in soil-forming processes. In intensive vegetable cultivation, there is little room for cover crops after harvest.

Objectives

Small-scale organic vegetable farms can introduce diversity into their crop plans by:

➔Undersowing (composite) cover crops in vegetables
➔Keeping the patch and/or tracks green

But HOW do you implement that?

Methodology

PARTICIPATORY PROJECT IN 2025 AND 2026

- Inventory of existing knowledge and experience
- **Annual on-farm tests** (about 20) with varied sowing dates and green manure mixtures
- **4 practical trials @inagro** with about 15 treatments
- Annual on-farm trials (3) for 'green paths'
- Further development of **mechanization** for undersowing and maintaining green paths in collaboration with Bert Vandergeynst – Boer Bricoleur
- **Experience exchange** among participants through field visits, WhatsApp group, etc.
- Collaboration with Viaverda: flower growers
- In-depth trajectory for green manures in vegetables in collaboration with ILVO in the project 'Ground2Live'

Impact

Low ⟷ High

Interaction with organic actors

Low ⟷ High

System approach

Low ⟷ High

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Medegefinancierd door de Europese Unie

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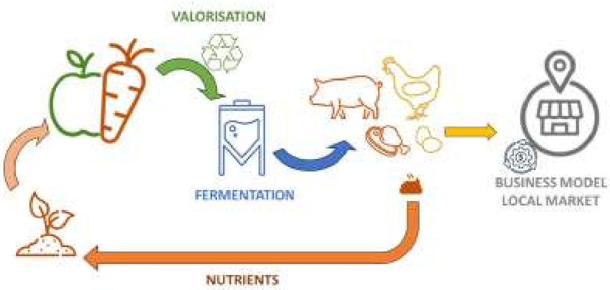
VALORAGRO: Valorization of agricultural production wastes through fermentation into pig and poultry feed



Context

Agroecological and organic production systems focus on self-sufficiency and closure of nutrient cycles at farm level. Animal production is under pressure to reduce inputs, be sustainable, while increasing animal health and welfare

Objectives

Implement agroecological principles to mixed animal production systems, through the valorization of agricultural waste streams via fermentation, for use in pig and poultry feed. Fermentation is a simple technique that farmers can use.

Methodology

- Consultation with farmers and stakeholders of the different LLs over the most interesting agricultural wastes.
- Look at feed composition and ingredients availability in different production systems
- Match fermented wastes with other feed ingredients to guarantee a positive effect on animal nutrient use efficiency, health and welfare
- Ecological and socio-economic impact at farm level will be assessed

System approach

Low High

Perspectives

Deeper understanding on how to integrate animal production in agroecological production systems.

Throughout the project, the direct training and follow-up during implementation of the proposed methods will help to smoothen the transition of animal production systems into agroecology at farm level, increasing their sustainability and decreasing environmental impact

Impact

Low High

Interaction with organic actors

Low High

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CPL-Vegemar Research in Vegetable Organic Farming

1) Efficacy of different bioinsecticides against pea aphids

Context

The aphid is the most important pest in peas, in addition to damage related to sap removal, aphids transmit viruses. Viruses can cause major yield losses in peas.

There are many bioinsecticides (fatty acid, essential oil, azadirachtin, …) on the market, but unfortunately their efficacy is not always proven.

Objectives

The aim of this trial is to compare the efficacy of different bioinsecticides against pea aphids.

Methodology

Trials are carried out in microplots in organic peas. Treatments are carried out according to aphid infestations. The efficacy of different products is measured (aphid count) and presence of virus on peas.

System approach

Low — High

2) Intercropping management before organic beans

Context

Organic industrial beans are sown late in the season, mid-June at the earliest. This implies a very long intercropping period, during which there are risks of weed growth and erosion. The lot of mechanical works dry out the soil.

Objectives

The aim of this project is to find the best solutions for managing this long intercropping period (planting a double cover crop, timing and method of destroying the cover crop, …) Beware that seed flies can be a problem if organic matter is not decomposed.

Methodology

The trials are carried out in strips in an organic bean field where various cover crops are sown in spring (clover, oats, buckwheat, etc.). The cover crops are destroyed at different times. The bean emergence is observed.

System approach

Low — High

3) Efficacy of different biofungicides against carrot foliar diseases

Context

The two main leaf diseases affecting carrots are powdery mildew (*Erysiphe heracleid*) and alternaria (*Alternaria dauci*).

Solid sulfur is commonly used in organic farming to combat carrot diseases. It is effective but less convenient to use. There are many other biofungicides (bacteria, biostimulants, …) on the market and it's not always clear how effective they are.

Objectives

The aim of this project is therefore to compare the efficacy of different biofungicides against foliar diseases in carrot and compare them with sulfur (solid and liquid).

Methodology

Trials are carried out in microplots in organic carrot. Foliar treatments are carried out every 10-15 days. The efficacy of different products is observed visually, as well as yields.

System approach

Low — High

Results and perspectives

For project 1, unfortunately the year 2024 was not conclusive due to the low presence of aphids. The trial will be repeated in 2025.

Project 2 and 3 are financed by the Walloon Region as part of the "Plan de Relance". The two research themes have been selected by organic farmers. The second test year for both projects will take place in 2025. We hope to be able to present results by the end of 2025.

Impact

Low — High

Interaction with organic actors

Low — High

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Wallonie Relance

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Organic field cropping systems trial (SYCBIO)

Context

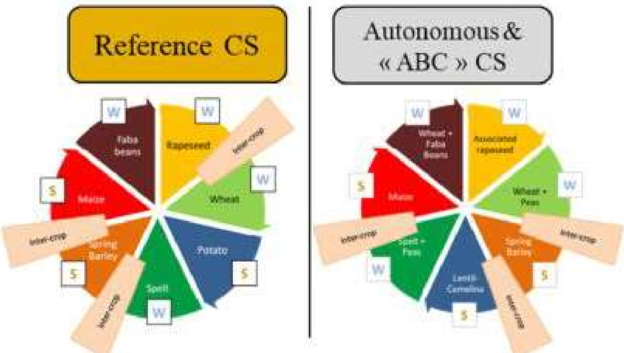
This experimentation was build between 2016 and 2018, when the conversions of farms specialized in main crops were increasing. In these farms, the main issues concern weed management and soil fertility.

Objectives

The major challenge is to maintain sufficient profitability without livestock and vegetable crops, while considering the positive or negative impacts of agricultural practices on agronomic aspects (soil characteristics, quality of the productions, plant health, …). The objective is to compare cropping systems with each other but also to observe the evolution of the characteristics of a cropping system over time.

Methodology

Two cropping systems compared to a reference one are assessed in this trial with the monitoring of a set of indicators focused on plant, soil or system compartements.



CS	Name	Fertilization	Soil Tillage	Rotation
1	Reference system	COF* inputs	Plowing	Pure crops
2	Autonomous system	No COF*	Plowing	Associated crops and legumes
3	« ABC » system	No COF*	No plowing	Associated crops and legumes

*COF = Commercial Organic Fertilizer

System approach

Low — High

Results and perspectives

The monitoring of a high number of indicators allows to compare the global performances of the three systems. One of the perspective is to redirect the crop management technique by learning from inefficient practices based on the results from the first rotation.

Impact

Low — High

Interaction with organic actors

Low — High

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