ARVALIS
Institut du végétal

ARVALIS's work in 30 examples

2021/2022

Anne-Claire Vial
President of ARVALIS - Institut du végétal

Extreme weather events, instability on an international scale, record inflation, a health crisis: our look back at the 2021-2022 campaign confirms the fundamental need for agriculture to be resilient and capable of adapting in the face of these hazards and uncertainties. To find the appropriate solutions, the accessibility of ARVALIS – Institut du végétal and its willingness to listen to producers and all those operating in the sector – in conjunction with its partners involved in field crops and livestock farming – is a major asset. First of all, this year's campaign demonstrated this in relation to short-term issues. The same was true for medium term issues, as we assisted with the launch and roll-out of innovations. And in the long term our contribution consisted of applied research directed towards sustainable solutions.

30 different examples will provide you with an overview of the work carried out by ARVALIS – Institut du végétal whose originality and scientific robustness reflect its relevance. Research on adapting agriculture to combat global warming and the participation of the agricultural world in its mitigation are key examples. The Institute also demonstrates its influence beyond the borders of France and its investment in the region via its land and agriculture.

Finally, as President of ARVALIS and on behalf of the Institute's colleagues, I assure all farmers that our commitment to them is, and will remain, total in the face of the challenges of an ever-changing world.

→ The complete activity report is available online at **arvalis.fr** (in French)

Theme 1.

Developing profitable, value-generating agriculture in every region

"Cap Proteines" assisting with self-sufficiency

The "Cap Proteines" programme is the research, development, innovation and transfer component of the "Plan Proteines" or "Protein Plan" launched by the public authorities to reduce our dependence on imported plant proteins.
ARVALIS – Institut du végétal (agricultural research organisation dedicated to arable crops) is co-piloting the element of the programme relating to ruminant production with IDELE, the French livestock Institute. For example, this involves identifying protein production solutions "on the farm", by evaluating combinations of new legume species in grassland. Initial data are encouraging. So, farmers who fatten their cull cows on pasture can double their margin by reducing feed purchases for their herd.

CAP PROTÉINES
innovons pour notre souveraineté protéique

15 april 2022

Laying of the foundation stone of the MetA experimental methanisation unit in Montardon (64).
This project is the outcome of the partnership between ARVALIS and APESA (Association for Environment and Safety in Aquitaine).

The richness of diversification

The introduction of legumes in crop rotations on European farms is having a notably positive impact on regions, farms and food supply even if there are still obstacles to be overcome (for example, the storage capacity of collectors). These results originate from the European DiverIMPACTS project, coordinated by INRAE (National Research Institute for Agriculture, Food and Environment) and the Centre Wallon de Recherches Agronomiques (CRA-W - Walloon Agricultural Research Centre). It has mobilised around a hundred partners from eleven countries, including ARVALIS, which organised a network of ten experiments. Its multi-criteria analysis tool, Systerre®, was used to assess the effects of diversification.

To sum up:

With **ImpactCoutProduction**, (ImpactCostProduction) tool, freely available on the arvalis.fr website, farmers can estimate the impact of increases in input costs on their own farm.

Testimony

François Mandin

PRESIDENT OF APAD (ASSOCIATION FOR THE PROMOTION OF SUSTAINABLE AGRICULTURE)

The partnership agreement, signed in March 2022 for five years with ARVALIS, will structure our collaboration around Soil Conservation Agriculture (SCA). Its first theme focuses on the recognition of the specific nature of SCA, i.e. the absence of tillage, permanent coverage of the soil and diversified rotations. Based on our issues relating to the land, we will jointly create experimental programmes to be conducted on large plots and coordinated by engineers from our networks. For example, we know that the dynamics of nitrogen are totally different in our untilled soils with organic matter on the surface. But we need precise technical knowledge, decision-making criteria and tools, particularly to reduce risks in the face of climate change.

Theme 2.

Meeting market demand and ensuring food security

A new newsletter: Qu@lités des grains (Grain Qu@lities)

The new e-newsletter, Qu@lités des grains, circulates the results of the numerous studies conducted by ARVALIS on the qualities of cereals used in human food, both in terms of health and with regard to their ability to be processed. Freely available on arvalis.fr, there are already three editions for the 2021-2022 campaign: the first on the baking performance of the main varieties of bread wheat harvested during the year, the second on the performance of new varieties of bread wheat and the third on the place of mixes of bread wheat varieties sown in France.

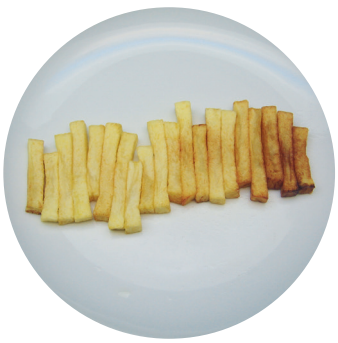
900

people from 31 countries attended the Arvalis presentations of the quality of the 2021 harvest in seminars/webinars organised by Intercéréales.

To sum up:

As part of the **Evagrain**, **project**, ARVALIS has developed a method of making sandwich bread in moulds to determine even more precisely the suitability of wheat varieties for processing.

DigiFrite measures the colour of chips



The colour of chips is a marker of the formation of acrylamide, a compound suspected of being carcinogenic. Special monitoring by experts who analyse colour chip by chip is therefore justified. ARVALIS was able to use DigiFrite to automate this measurement. How did it do this? 23, 000 chips were photographed in a booth in a standardised lighting environment and scored simultaneously by an expert. By using this data to train algorithms through machine learning, Digifrite can now produce an evaluation of the colour of chips which is as accurate as that of the expert's eye.

Testimony

Vincent Poudevigne

MANAGING DIRECTOR
OF SICA ATLANTIQUE

Our relationship with ARVALIS dates back a long time, so we immediately embraced the idea of the Forum Blé tendre Océan Centre Ouest (Bread Wheat Ocean Centre West Forum (OCO) conference. It was held in La Rochelle on May 17, 2022 consolidating all the operators in the area around the quality and quantity of cereals exported from the port of La Pallice. We must ensure that the end customer receives the goods they need and that we are collectively able to meet all market demand. Several hundred participants attended the conference, ranging from those involved in production and the users of French sectors to logistics operators like us. The needs of international clients were represented by Intercéréales.

Theme 3.

Reducing the use of synthetic inputs and fossil fuel consumption

To sum up:

Thanks to the bioindicators developed under the **AgroEcoSol project**, farmers can now obtain a complete diagnosis of their soil fertility components, providing leverage for the agroecological management of this fertility.

Vigicultures® becomes the national base for plant health bulletins for all crops

Every year the Vigicultures® web portal collects and shares some 400,000 items of observational data on bioaggressors in field crops. They are used to produce plant health bulletins. Farmers can use these bulletins to find all the information they need to independently make a strategic decision to reduce the use of crop protection products. Developed in 2008 by ARVALIS, Terres Inovia, ITB and Acta, it has been selected by the Ministry of Agriculture and Food to centralise data for all other crops.

40

this is the number of partnership projects on crop protection
in which ARVALIS teams are involved.

CHN-conduite is deployed

ARVALIS is generalising the use of its nitrogen supply management tool, CHN-conduite, so that it reflects the needs of plants as closely as possible. After five years of experimentation with microplots and an initial test in 2021 on fifteen farmers' plots, its roll-out is continuing with around sixty plots throughout France. User feedback can be gathered in this new step towards the finalisation of an operational decision support tool.

Testimony

Thomas Bourgeois

PRESIDENT OF FNAMS (NATIONAL FEDERATION OF SEED MULTIPLIER FARMERS)

The multiannual programme for agricultural and rural development *COMETE, (COMbiner création de valeur Economique et Environnementale dans les Territoires* -COMbining Economic and Environmental value creation in the Countryside) is launched for the period 2022-2027. Being its co-director with ARVALIS is an indication of our shared ambitions for crop protection, with a view to achieving greater restraint in terms of inputs and adapting production systems to climate change.
We have just signed a new framework agreement to cover this entire programme. Our relationships are indeed very long-standing and numerous: at an institutional level, since we are members of the ARVALIS board of directors, and its Secretary general sits on the FNAMS board, and because of our research into the species we both monitor: cereals and forage crops.

Theme 4.

Adapting agricultural production to climate change

ARVALIS coordinates the Root2Res European project

This is a first! ARVALIS is coordinating a European collaborative research project: Root2Res (Root phenotyping and genetic improvement for rotational crops resilient to environmental change). Winner of the Horizon Europe call for projects of October 2021 and with a budget of around eight million euros, it brings together twenty-two partners from thirteen countries in Europe and Africa.
Root2Res aims to increase our knowledge of the roots of cereals, potatoes and legumes, their role in tolerance to extreme environmental conditions (frost, heat, drought, etc.) and in the storage of carbon in soils.

Root2Res
Root phenotyping and genetic improvement for rotational crops resilient to environmental change

4 years

This is the duration of the new programme launched by ARVALIS with the University of Adelaide in Australia on improving the varietal tolerance of bread wheat.

To sum up:

The **ACCLIMATE** project will use the **ASALEE** tool to devise new rotation scenarios that break with current practices in the Auvergne-Rhone-Alpes region, in order to adapt to climate change.

ASALEE, winner of the Water Europe Innovation competition

The ASALEE tool, designed by ARVALIS, won first prize at the European Water Europe Innovation Awards 2022 in the Global Water Challenges category. This wide international acclaim highlights the agricultural innovation backed by ARVALIS and its partners (INRAE, Terres Inovia, the Chambers of Agriculture of Charente-Maritime and Deux-Sèvres) as well as the dynamism of farmers in adapting to climate change. ASALEE is used in R&D projects alongside farmers to optimise their performance and consumption of irrigation water.

Water Europe
Technology & Innovation
Global Water Challenges Award WINNER

Testimony

Marie-Pierre Cassagne

HEAD OF THE PRE-COMPETITIVE PROJECTS UNIT
AT VÉGÉPOLYS VALLEY

ARVALIS is an important actor in the ecosystem of our plant competitiveness cluster. One example of this is the CLIMAVEG project launched by the Brittany and Pays-de-la-Loire regions and ADEME Bretagne. Co-developed in 2020 in response to the demands expressed by stakeholders in the field, it began in February 2021, to run for four years, and deals with the transition and sustainability of plant production systems in the face of climate change. It is still too early to draw conclusions from the experiments set up, but already we are better informed about the climates of tomorrow and the identification of existing tools. CLIMAVEG's results will improve ASALEE, the tool for assisting with rotational choices for better management of irrigation water volumes, so that it meets the needs of our regions.

Theme 5.

Acting for the environment, promoting and enhancing biodiversity

20 years of system experiments in organic farming

On May 31, 2022, 80 professionals participated in the Tech&Bio day, organised in Etoile-sur-Rhone (26) by the Chamber of Agriculture of Drome, ARVALIS, FNAMS, AGFEE and Terre Inovia. These five partners in the long-term system trial, which has been underway in Dunière since 1999, are testing various rotations and fertiliser inputs on a three-hectare plot to address the issues of farmers implementing organic farming. Participants were particularly interested in the changes in soil fertility.

tech&bio

To sum up:

The experimental station of La Jaillière (44) is the ARVALIS reference platform for biodiversity and integrated protection. The teams study different levers benefiting them such as crop rotations, the implantation of buffer strips and hedges (17km in total for the station), auxiliary insects, etc.

33

this is the number of partners, including ARVALIS, working on carbon sequestration
in the ClieNFarms European project coordinated by INRAE.

Pollinators in crops: an original study

Bread wheat, barley and potatoes do not attract wild bees, bumble bees or honey bees: this is the conclusion of a study conducted by ARVALIS in 2021. These pollinators are indeed rare when these crops are flowering. ARVALIS counted them on ten plots per crop, in different regions, over several days and at different times on the same day. There were at most a few dozen pollinators per hectare, very far from the 1000 to 2500 pollinators/ha on crops that are very attractive such as rapeseed. What is more, the pellets recovered at the hive entrance do not contain wheat, barley or potato pollen either.

Testimony

Alexandra Pinaton

DIRECTOR OF THE CPIE (PERMANENT CENTRE FOR ENVIRONMENTAL INITIATIVES) OF MEUSE

On June 30, 2022, we signed a framework agreement with ARVALIS to make further joint progress on experimentation, initiation of collective dynamics, implementation of agroecology and communication. In 1999 we collaborated on the revitalisation of the landscape of its station at Saint-Hilaire-en-Woèvre (55). In 2018, we responded to a call for proposals from the Biodiversity collective of the Grand-Est region, which brings together the Regional Council, DREAL, agencies in the Basin and the Office Français de la Biodiversité (French Office of Biodiversity). ARVALIS has made a commitment to functional biodiversity in agriculture. This year, the operational implementation of the framework agreement involves establishing functional biodiversity indicators and hedge mulching. We envisage an ambitious programme by mobilising new funding levers.

Theme 6.

Promoting the updating of our frames of reference and meeting expectations through our support activities

Third place at the Varenne de l'Eau Hackathon

A group of five colleagues from ARVALIS won third place at the Varenne agricole de l'eau et de l'adaptation au changement climatique (French roundtable on water and adaptation to climate change) Hackathon. This competition, held in Drome from 3 to 5 December 2021, required the development in a limited time of a digital tool for farmers. Named StrateViz – Bread wheat, their prototype visually compares two technical process strategies within the context of climate change. Its benefit, thus recognised, opens the door to operational development.

To sum up:

ARVALIS is using the **NumExpé**, programme to move on to digital experimentation: Smartphone app for data entry in the field, use of sensors and cameras to measure plants and harvested products, etc.
Our ambition: to connect all these tools by 2030.

267 000

this is the number of monthly visits to the institute's websites, now brought together at one single address **arvalis.fr**.

LITERAL booms are deployed

LITERAL, a hand-held, high-throughput crop phenotyping tool, automates the acquisition of observational data on plants in the field. Funded by CASDAR, its development has been under way since 2019 as part of a project led by ARVALIS. All of the Institute's experimental stations are now equipped with over 100,000 observations. Certain types of data are no longer measured manually, such as estimating the area of wheat foliage or counting flax plants.

Testimony

Herinaina Andriamandroso

RESEARCH PROFESSOR
ISA LILLE - JUNIA

It is very important for our students to be able to see the new technologies used in agriculture and livestock farming. In 2019, together with ARVALIS, we organised a student group visit to its station at Villers - Saint-Christophe. The one-day format is ideal, with a morning presentation of the projects on which its team is working, the tools deployed and the results for the year. Then, in the afternoon, we go into the field to observe the trials using sensors for storage and phenotyping or other tools for monitoring crop growth, etc. The visits are also an opportunity for ARVALIS to establish contacts with our work-study students or, through them, with the companies that employ them.

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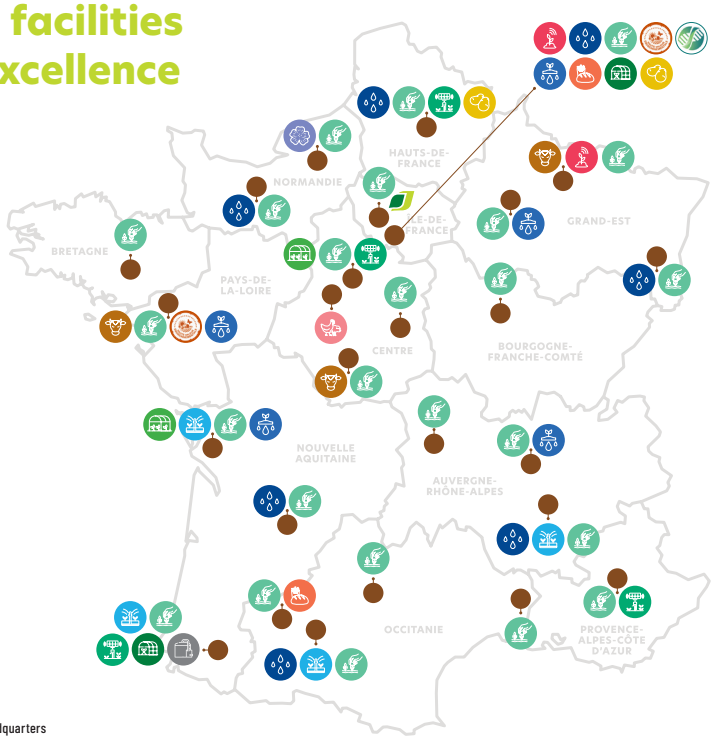
ARVALIS
Institut du végétal

ARVALIS - Institut du végétal is an applied research organisation, specialised in arable crops (cereals, maize, sorghum, potatoes, flax, and forage crops). The Institute's mission is to be a useful, accessible and reliable technical reference for farmers, the value chains and the French and European public authorities. As part of the agro-ecological transition, its scientific expertise aims to support agricultural production of sufficient quality and quantity to satisfy markets and consumers.

27 sites and facilities of excellence



- Headquarters
- Mobile shelters
- Dairy or beef cattle
- Monogastrics facility
- Flax scutching unit
- Digital farm
- Mobile fogging devices
- Smart irrigation
- Light phenotyping equipment
- Heavy phenotyping equipment
- High environmental value application farm
- GenoPAV
- Parcels equipped with instruments for water quality
- Quality analysis centers (grain and potatoes)
- Greenhouses and climatic chambers
- Potato storage and R&D
- Anaerobic digester

Key figures

460
collaborators

–

More than 1 600
agronomic trials

–

400
farmers members of vocational guidance commissions

–

60 M€
allocated to R&D

In partnership with organisations
(Intercéréales, SEMAE, FNPSMS, CNIPT, GIPT, CIPALIN, FNAMS, FNPT)

Avec la contribution financière du compte d'affectation spéciale développement agricole et rural CASDAR

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