INRAE AgroParisTech université PARIS-SACLAY

AGRONOMY
JOINT RESEARCH UNIT

Research in agronomy, from the field to the landscape and the supply chains

UNITÉ MIXTE DE RECHERCHE Agronomie CONNAISSANCES ET CONCEPTION POUR ACCOMPAGNER

Who we are

- **Three monitoring boards:** INRAE AgroParisTech université PARIS-SACLAY

- **Management team**
  - Arnaud Gauffreteau, head of the unit
  - Muriel Valantin-Morison, deputy head of the unit
- **35 permanent INRAE and AgroParisTech staff**
  - 8 research fellows, 2 research directors, 3 senior lecturers, 3 professors, 11 engineers, 2 technical assistants, 1 assistant engineer, 3 experimental technicians and 3 administrative technicians
- **35 contract staff**
  - 12 contract ingineers
  - 13 PHD students and post-doctoral fellow (over the 2018-2023 period: 9 theses defended)
- **Parity**
  - Permanent staff: 45% women - 55% men
  - Contract staff: 55% women - 45% men

Activities

- **Knowledge production**
  - Accounts for approximately 50% of our working time
- **Teaching (SIAFEE department at AgroParisTech)**
  - Master 2 ‘From agronomy to agroecology’, Engineering course (DA PISTv)
- **Contribution to the coordination and administration of research**
  - Agroecosystem Department INRAE, PERSYST CIRAD
- **Promotion of research results for the benefit of society**
  - Contribution to assesment reports & forecasts (withdrawal of neonicotinoids, copper and glyphosate, 4 per 1000 initiative, GREN Île de France)
  - Scientific advice ITB, FNcuma, CTPS, ITEIPMAI, PNR Vexin, Seine Normandy Basin Committee, etc.
  - GIS, RMT, CST EcoPhyto
  - AFA, Academy of Agriculture
  - Hosting secondary school students, participation in scientific culture activities (Science Festival)

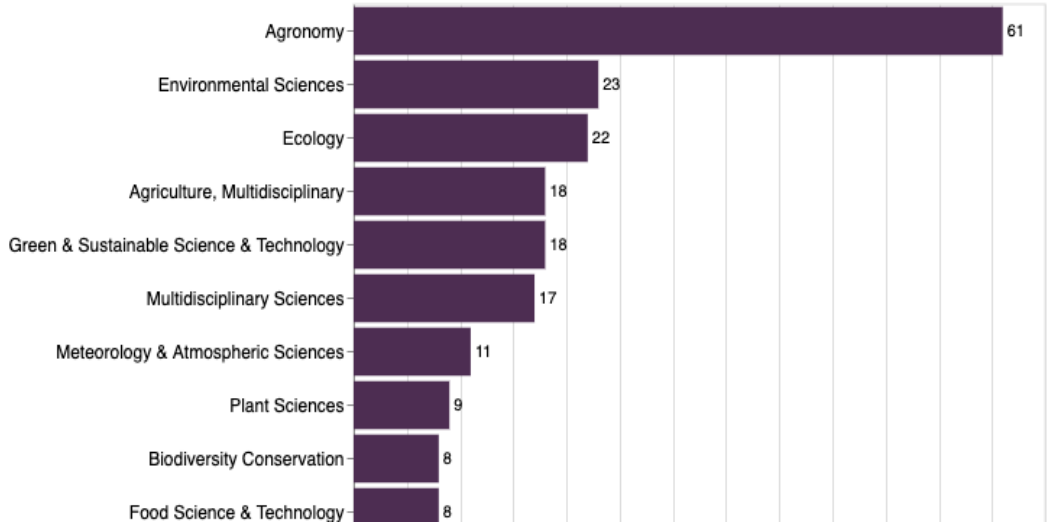
Scientific production

Diversity and multidisciplinarity

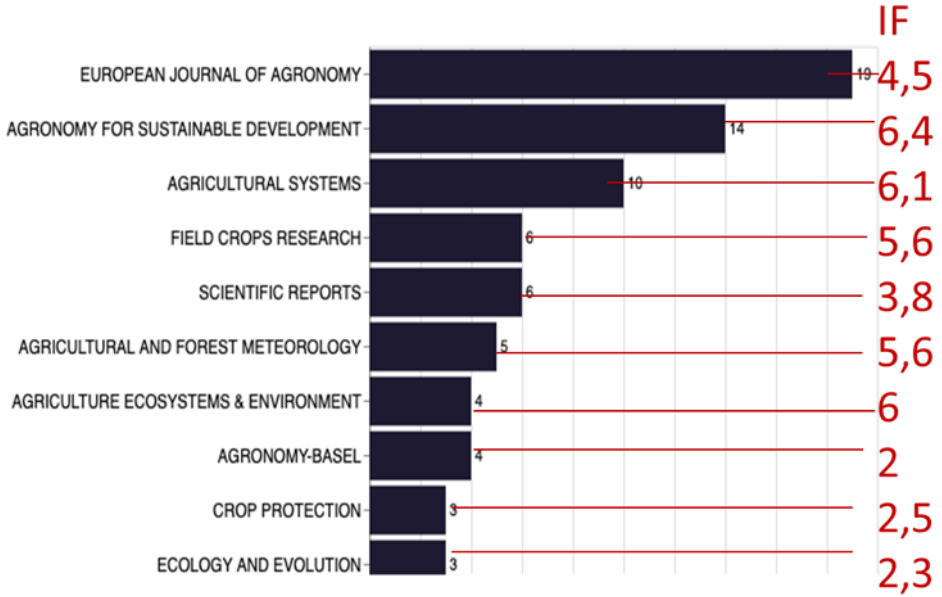
Over the period 2018-2023:

- **207 peer-reviewed articles – 38 book chapters** – approximately 190 citations in WoS

Main disciplines : agronomy & environment



Renowned journals in our fields



Productions recorded in a specific HAL collection, therefore in free access:
https://hal-agroparistech.archives-ouvertes.fr/AGRONOMIE

A diversity of experimental devices

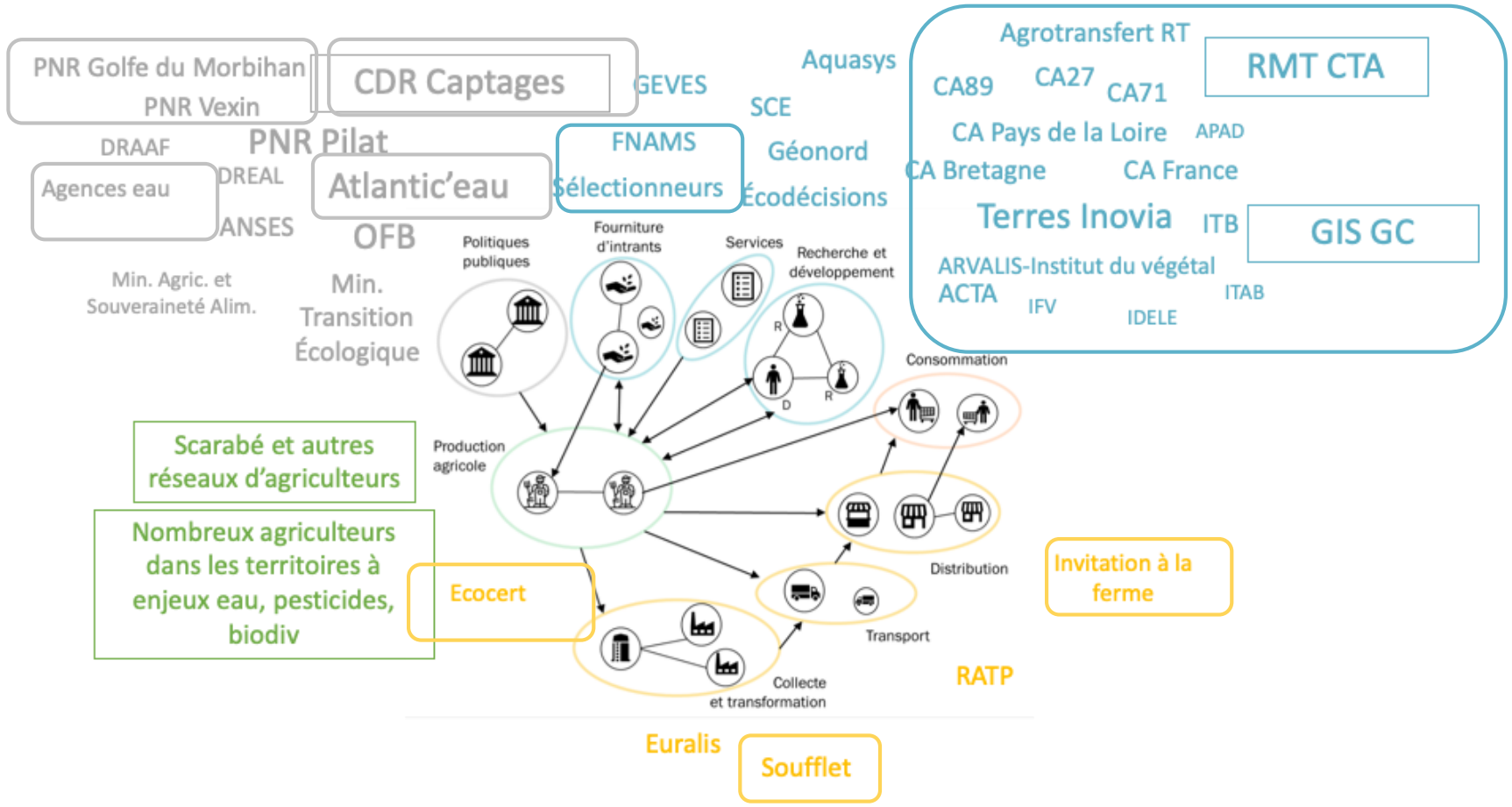
- **System trials to test innovative practices over the long term**
  - SIC trial (cultivation systems under constraints) 2008-2020 in Grignon
  - Trial known as ‘La Cage’ in Versailles since 1998, following four different cultivation systems and redefined in 2025.
- **An experimental unit undergoing major changes since 2017**
  - One ‘analytical’ trial each year at Versailles-Saclay experimental unit
- **Experimental devices located on farms**
  - On farm experiments (practices, flower strips)
  - Observatories and support for ‘territories’ where a territorial project is being developed with and for the actors involved

Local and national non-academic partnerships

Action research in partnership with stakeholders in the agricultural sector

- **Long-standing partners**
  - Technical institutes
  - Breeders
  - Chambers of Agriculture
  - Water quality partners

- **Recent partners**
  - Biodiversity stakeholders
  - Local stakeholders and downstream companies



Main focus of our work

“Agroecology is part of the solution”

- Agriculture has an evidence based environmental impact (MEA, 2005, etc.).
- Agroecology can help address these challenges:

  - By taking into account ecological processes in the cultivated field (Altieri et al., 2015)
  - By valuing practitioners' knowledge in a spirit of open innovation (Prost et al., 2016; Girard and Magda, 2018)
  - By reconnecting agriculture and food (Meynard, 2017)
  - By addressing these challenges from the local to the global level (Grassini et al., 2017)

Transforming farming systems, from local to global, is at the heart of the challenges agriculture is facing in the future.

Issues we contribute to:

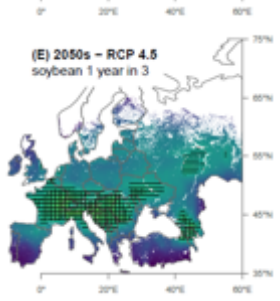
- **Biodiversity and reduction in the use of inputs:** mobilising different forms of biodiversity to ensure ecosystem services for pest control and nutrient recycling

Mixtures of varieties and species

OS #1 : Addressing environmental challenges and managing associated risks

- **Climate change (CC):** proposing scenarios to adapt to CC and limit its impact

Soybean yield (climate change scenario; 2050 horizon)



OS #2 : Accelerating agroecological and food transitions, taking into account economic and social issues

- **Agroecological and food transitions:** reconnecting farming systems with food systems

Legumes

Collective challenge

Contributing to change in agriculture

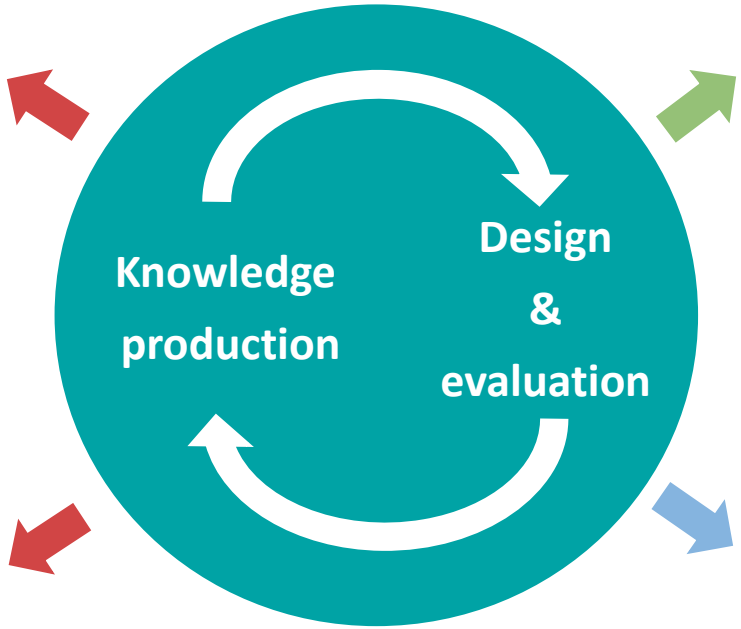
The unit's objective is to produce and mobilise scientific and expert methods and knowledge, from the local to the global level, in order to:

- Assess the environmental impacts and ecosystem services of current and alternative farming systems
- Support stakeholders involved in changing agricultural practices by working with them to develop resources

Design and evaluation, from local to global, of sustainable agricultural systems to move towards agroecological transition

An organisation with four research areas

Innovation & Farmers (IF)
Generating and mobilizing resources* to implement the agroecological transition across diverse agricultural systems.



Biodiversity & Services (BS)
Understanding the impact of biodiversity** on ecosystem services and disservices in a variety of cropping systems

***Cultivated, managed and associated biodiversity*

Supply Chain & Territory (ScT)
Generating and mobilising resources* for the agroecological transition of territories and supply chains

**knowledge, methods and tools*

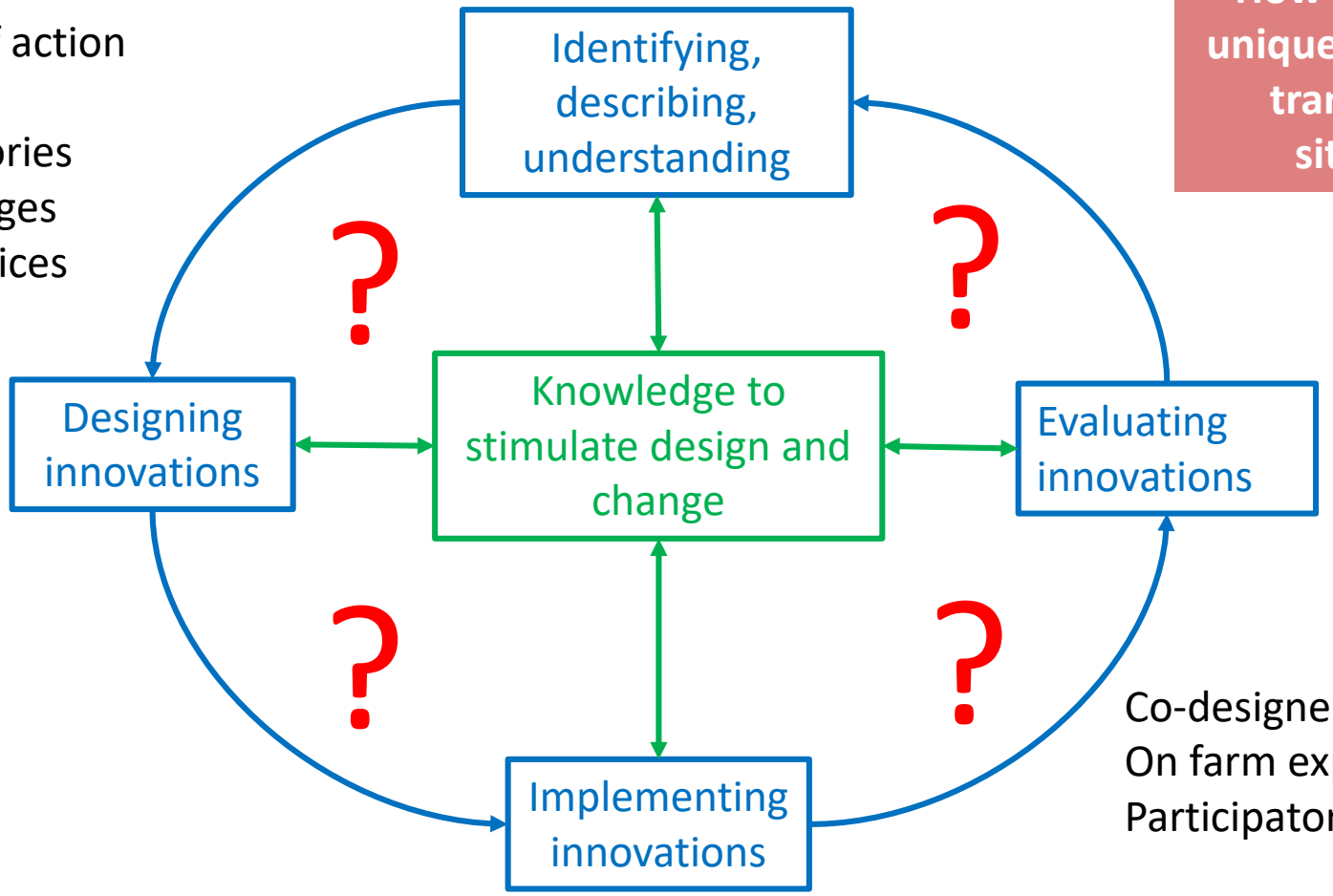
Global Agronomy (GA)
Analyzing on a large scale the impact of climate change and the agroecological transition on the balance between production and biodiversity.

“IF” area: Generating and mobilizing resources to implement the agroecological transition across diverse agricultural systems

Logic of action

Trajectories of changes in practices

How can we capitalise on unique situations to fuel the transition beyond the situations studied?



How can the design and evaluation of innovations be adapted to a variety of situations and species?

How to design/evaluate in situations of uncertainty?

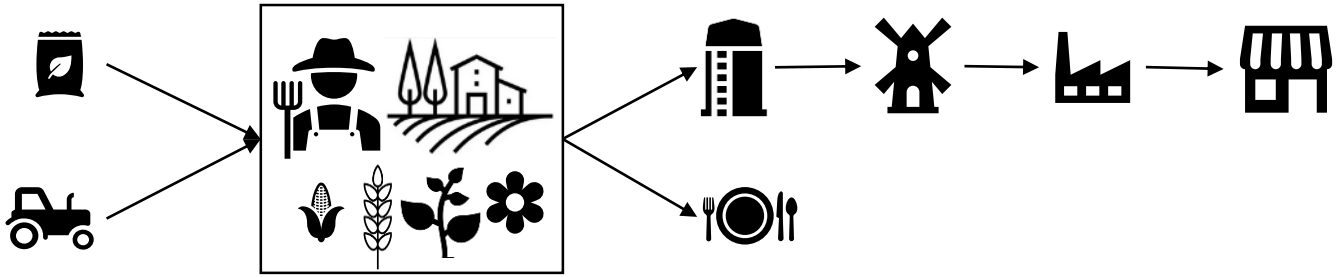
Co-designed experiments
On farm experiments
Participatory agronomic diagnosis

From Meynard et al., 2023

“ScT” area: Generating and mobilising resources for the agroecological transition of territories and supply chains

How can we design with all stakeholders of the supply chain

Adapting the selection, evaluation and propagation of varieties to the constraints of agroecology



Analyzing and supporting coupled innovation processes between agricultural production and food processing stakeholders

How can we design innovations with a diverse range of stakeholders to achieve an agroecological transition of agri-food systems across the whole territory?

“BS” area: Understanding the impact of biodiversity on ecosystem services and disservices in a variety of cropping systems

How does biodiversity in the plot and the territory affect pest populations for a variety of farming systems

Which species (pure and in mixture) for a diversity of farming systems and expected services?

Biodiversity

Planned biodiversity

Intercropping

Amenities

Cropping pattern

Associated biodiversity

Crop auxiliaries

Pests

Pratiques

Systèmes de culture

- Valorisation of internal data and data from national databases
- Hybridisation of knowledge

Fertility (Nitrogen)

Services

Production

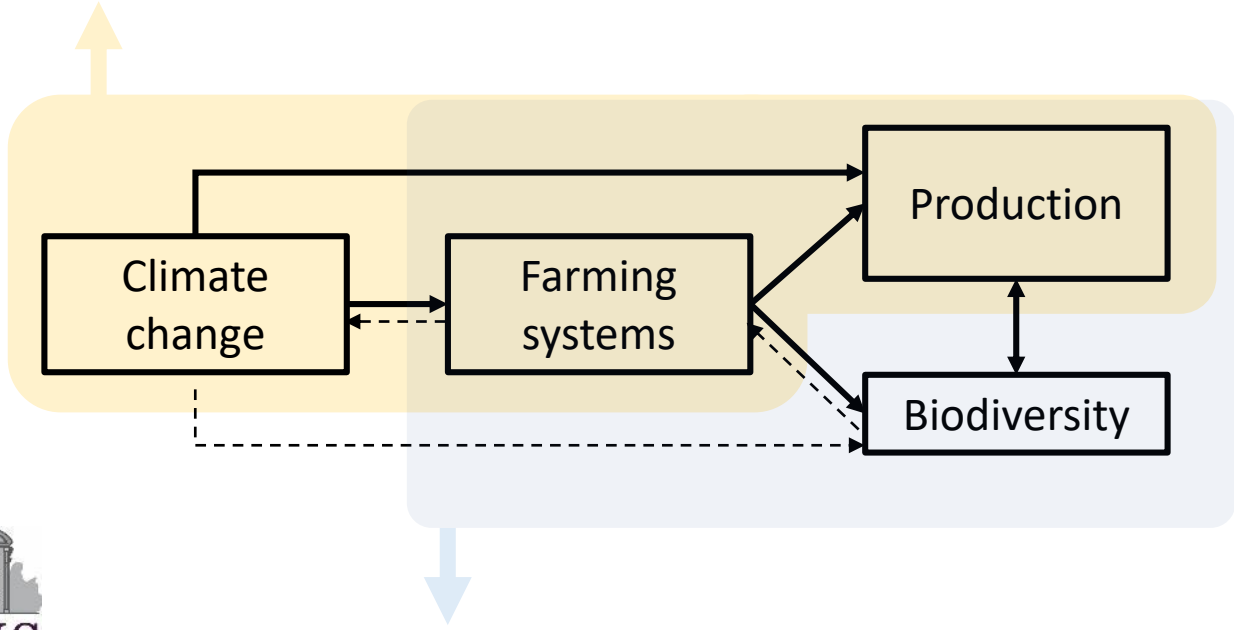
Regulation (pests)

What annual and multi-annual interactions occur between trophic levels in a variety of sustainable farming systems?

What impact do farming systems have on the harmfulness of pests?

“GA” area: Analyzing on a large scale the impact of climate change and agroecological transition on the balance between production and biodiversity

1. What are the impacts of climate change on field crops?
2. Can agroecology levers help us adapt to future climate conditions?



Methods

- Machine learning with large datasets (climate, yield, agricultural practices, biodiversity)
- Meta-analysis
- Food system models

3. Do agroecology levers improve the biodiversity-production trade-off at different spatial scales?

Teaching - training

- **Investing in the BIOSPHERA graduate school**
  - Hosting the AAE Master (from Agronomy to Agroecology)
  - Managing the Master's programme in Agrosciences, Environment, Territories, Landscape and Forestry (AETPF)

- **Thesis supervision**
  - ABIES Doctoral School: being part of the Scientific and Educational Council
  - Teachers and researchers with HDR qualifications on the rise

- **INRAE scientists from the UMR investing in education**
  - Significant participation in master's / engineer teaching modules
  - Organization of training courses for researchers and professionals (Research School – Tool Training – RMT, etc.)
  - Participation in discovering research professions: Internships for 9th and 10th graders

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Ecole Doctorale ABIES Doctoral School

Researcher school: Innovative design to promote innovation and creative research (October 2024 in Saclay)

CO-CLICK'EAU

The joyful team…