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# RECOTOX: a network of research sites to implement multiple and multi-scale approaches for *a posteriori* environmental risk assessment in agricultural systems

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# Context and objectives of Recotox

- ❖ For many years, the scientific community underlines the lack of **long-term** and **wide scale monitoring** of **chemical effects** on ecosystems.
- ❖ Ecotoxicological studies are mostly supported by **protocols often far away from realistic environmental conditions**.
- ❖ Hence, our **potential to understand and foresee the ecotoxicological effects** remains **limited**.
- ❖ In this respect, the aims of RECOTOX are to:
  - **Promote a transverse and integrated research** to follow, understand and mitigate the environmental (and health) impacts of pesticides,
  - **Analyse the chain “pressures-exposures-impacts“** by coordinating and integrating the *in natura* observation and experiment in **spatial ecotoxicology** and toxicology,
  - **Share** between its sites a **common culture** in ecotoxicology.

# Why RECOTOX?

## ❖ Needs expressed by the scientific community

- Scientists: controlled conditions > *in natura*, realism, long-term
- Site managers: opening and évolution

## ❖ Needs expressed by programming organisations

- 2013 : IFRES report by the Group inter Alliances AllEnvi, AvieSan et Athena
- 2014 : Workshop INRA-AllEnvi : Pesticides, ecotoxicology and environmental exposure
- 2015 : CNRS-INSU and Ecodyn program
- 2017 : Workshop GT9 AllEnvi : new scientific challenges near risks and catastrophes
- Ecophyto program ...

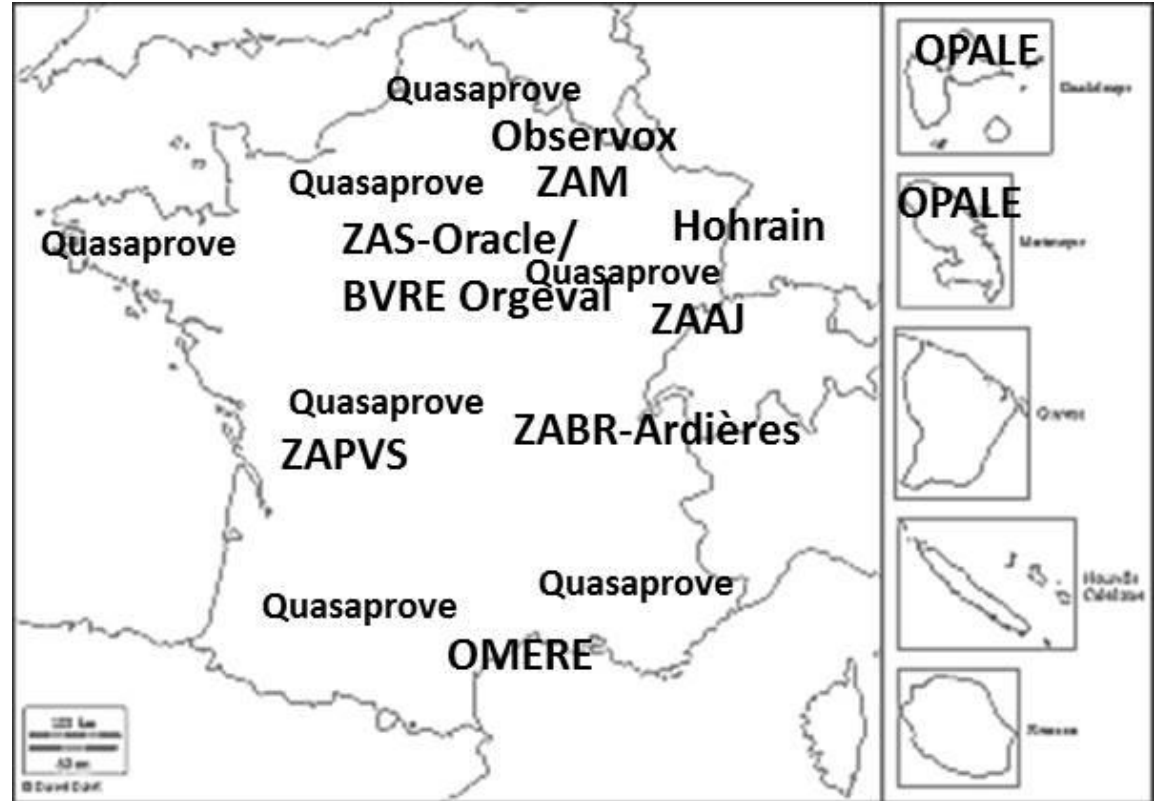
## ❖ Needs expressed by other stakeholders

- ANSES, phyto-pharmacovigilance
- Public society
- Open data and open science

# What is RECOTOX?

- ❖ **A network of sites** providing various and additional agro-pedo-climatic conditions to monitor, understand and mitigate the impacts of pesticides (synthetic, metals, biopesticides)
- ❖ **A scientific and operating project**
- ❖ **To consider:**
  - the chain pressure-exposure-impact
  - the factors controlling the vulnerability of the agro-ecosystems, their ability of résilience
  - the exposure to multi-substances, the multiple stress and their long-term effects
  - the various compartments of agro-ecosystems
  - In realistic *in natura* conditions
- ❖ **To be the French focal point**, partner for discussion with stakeholders (risk assessors and managers, pharmacovigilance...), provider of open data...

# The sites



*Quasaprove*

....



# Synergy / interest of the sites

## ❖ Agro-pedo-climatic conditions

- Crops, vineyards, meadows
- Various degrees of intensification and pesticide use
- Various contexts of contamination (type, amount, temporality and spatialisation)
- Types of soils (continental, tropical...)

## ❖ Environmental compartments

- Soils
- Plants
- Terrestrial and aquatic fauna
- Surface and ground-waters
- Air

## ❖ Studied scale

- Plot, small (10 km<sup>2</sup>) large (100 à 1000 km<sup>2</sup>) catchment

## ❖ Disciplines, approaches and knowledge

- Soil science, agronomy, hydrology, chemistry, biology, ecotoxicology...
- Survey, field monitoring and experiment, analytical methods, modeling
- Field and laboratory pre-existing instrumentation
- Pre-existing data (including long-term sequences)
- Existing sample collections (soils, DNAs...), passive samplers...
- Links with operational partners

# The project, since 2017

- ❖ **WP0 : animation and management of the network**
- ❖ **WP1: promoting the network for an integrated and transversal research in ecotoxicology**
  - Incubation for innovative projects and production of position papers
- ❖ **WP2: up-scaling approaches in ecotoxicology, from plot to landscape, considering several compartments (soil, water, air, biota)**
  - Support for increasing ecological relevance, up-scaling
- ❖ **WP3: from ecotoxicology to toxicology**
  - Characterisation of exposure, and (human) exposome
- ❖ **WP4: harmonizing analytical methods and measurements, sharing equipments, documentary resources, technological intelligence within the sites**
  - Methods, skills and equipment sharing, quality management (reliability, traceability)
- ❖ **WP5: developing a focal point to acquire, store, diffuse and archive data for end users at the local and national scale**
  - Metadata standardization, geo-referenced sites, data management plan
- ❖ **WP6: communication, exploitation and dissemination of results**
  - Scientific and technical publication, training, workshops



# A added value in the field of ecotoxicology for existing « infrastructures »

scientific animation  
and dissemination  
of results



observation and  
experiment  
*in natura*



observation and  
experiment in  $\pm$   
controlled conditions



safekeeping of  
environmental  
samples



information system,  
data management  
and modeling

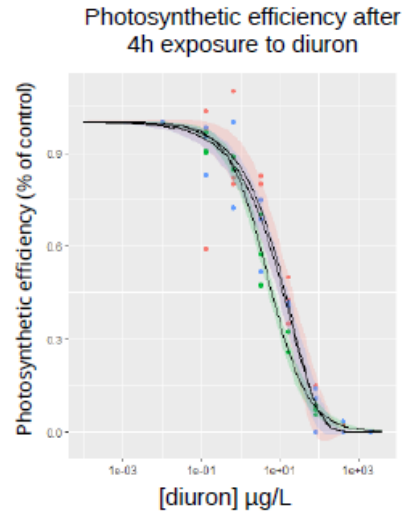
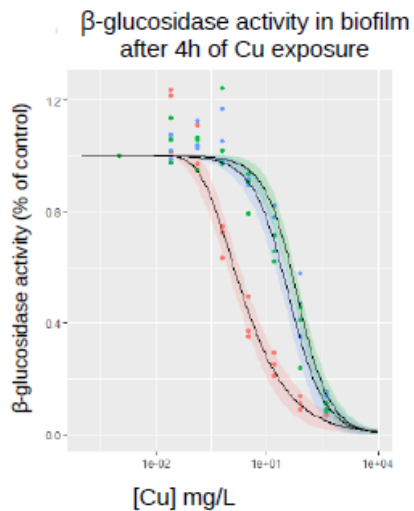


analysis and  
monitoring



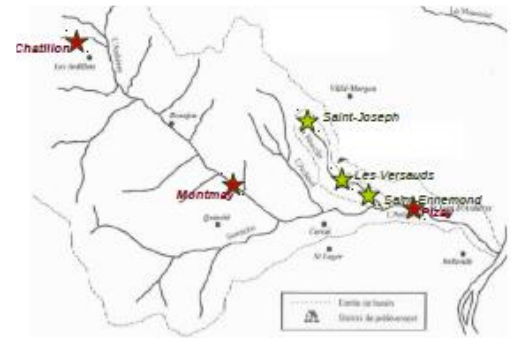
# Example of a posteriori environmental risk assessment:

## microbial adaptation as a tool to detect pesticides impact on Morcille and Ardières river (Beaujolais, France), may 2017



Site

- Chatillon
- Montmay
- Pizay



- Cu is present at higher levels at Montmay and Pizay stations than in the upstream station Chatillon
- Diuron levels are similar within the 3 stations tested

# In conclusion

## ❖ RECOTOX

- **An exciting project**
- **Exhibiting factors for success (dynamism, recognition, the « missing stone » ...)**
- **But also challenges (common and shared culture, progress, interoperability...)**



*Thanks for your attention !*



**We are grateful to:**

- Site managers
- Alliance AllEnvi



# For more information

- ❖ **Contact** : [contact-recotox@inra.fr](mailto:contact-recotox@inra.fr)
- ❖ **Website** : <http://www6.inra.fr/recotox>
- ❖ **Video** : <https://www.youtube.com/watch?v=SVpAYNs4hEw>

(watch on the Youtube channel: ecotox tv)

- ❖ **Subscribe to the Recotox Newsletter !**