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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

Christian Mougin[1], Véronique Gouy[2], Vincent Bretagnolle[3], Julie Berthou[1]

contact-recotox@inra.fr

[1]UMR ECOSYS, INRA, AgroParisTech, Université Paris-Saclay, 78026 VERSAILLES
[2]UR MAEP, IRSTEA, 69626 VILLEURBANNE
[3]UMR CEBC, CNRS, Université de la Rochelle, 79360 VILLIERS-en-BOIS

Ecotoxicomic – 22 november 2017

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?

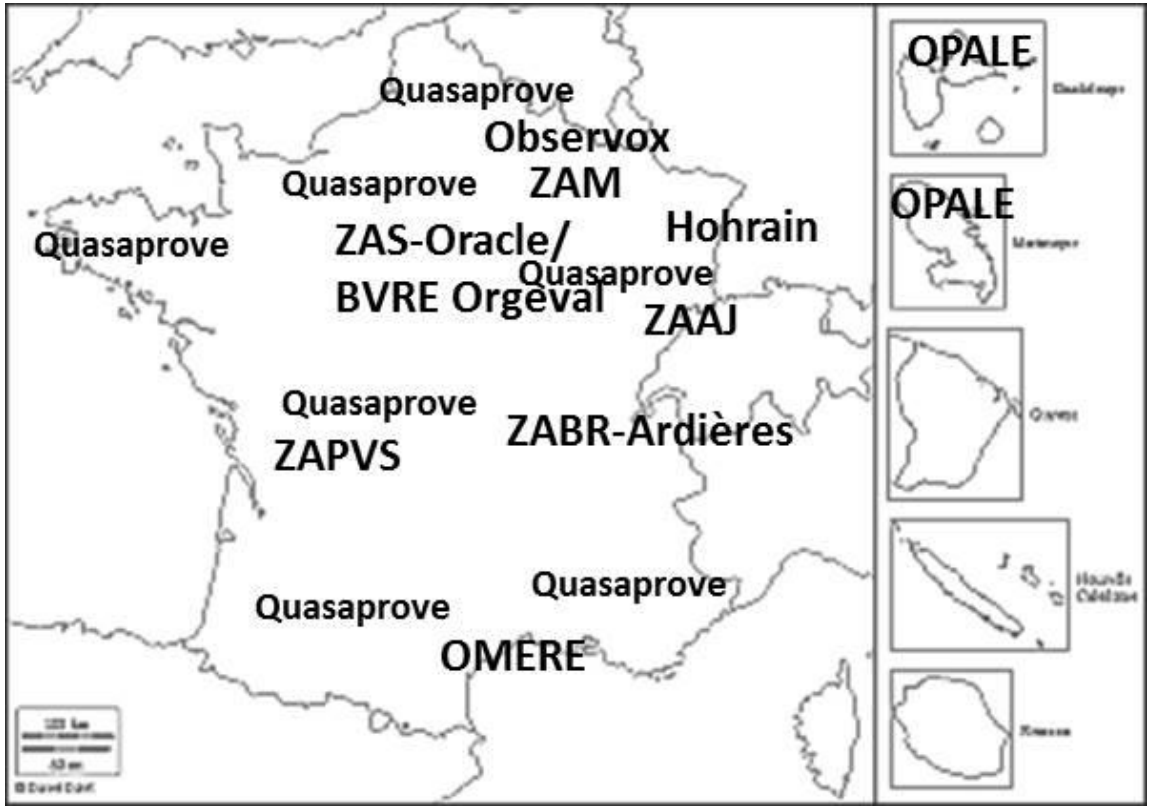
- **A network of sites** providing various and additional agro-pedo-climatic conditions to monitor, understand and mitigate the impacts of pesticides (synthetic, metals, biopesticides)

- **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



Zones Ateliers
LTER FRANCE

Quasaprove

….

RBV
RÉSEAU DES BASSINS VERSANTS

RECOTOX

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 km²) large (100 à 1000 km²) 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

ECOTOX

observation and experiment *in natura*

RECOTOX

observation and experiment in ± controlled conditions

ECOTRONS

AnaEE France

information system, data management and modeling

AnaEE France

analysis and monitoring

AnaEE France

INRA SCIENCE & IMPACT

irstea

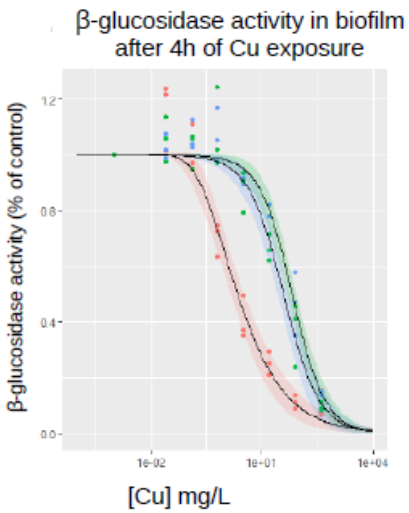
cnrs

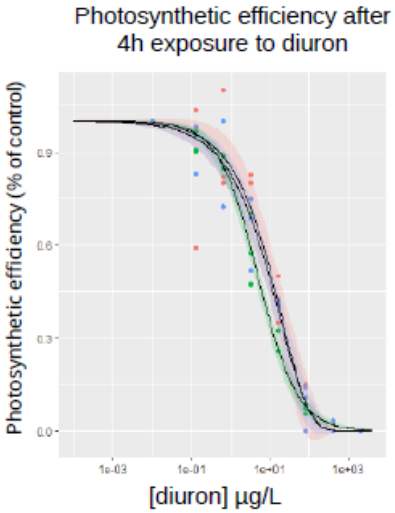
safekeeping of environmental samples

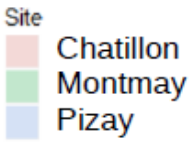
AgroBRC **BRC4Env**

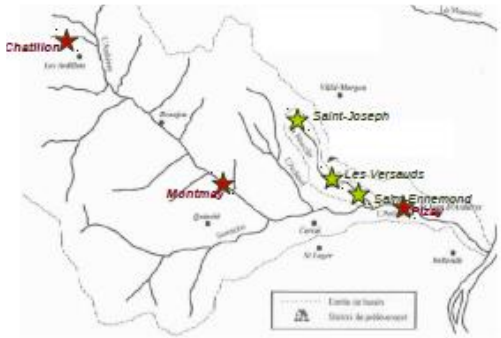
Example of a posteriori environmental risk assessment:

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









- 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

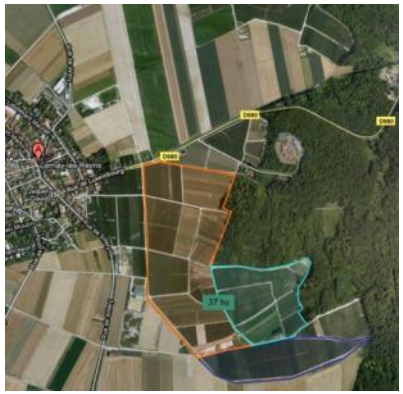
- **RECOTOX**

- **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

AllEnvi
Alliance nationale de recherche pour l'Environnement

For more information

- **Contact : 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)
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