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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 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



observation and
experiment
in natura



observation and
experiment in \pm
controlled conditions



safekeeping of
environmental
samples



information system,
data management
and modeling

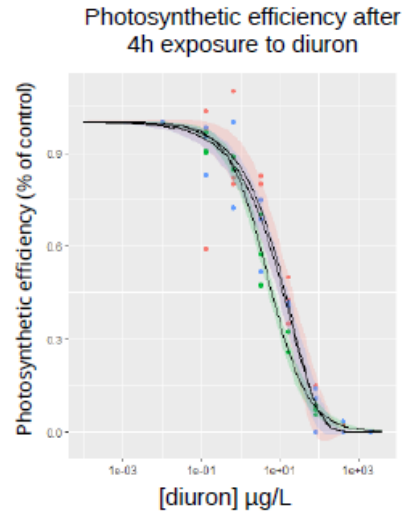
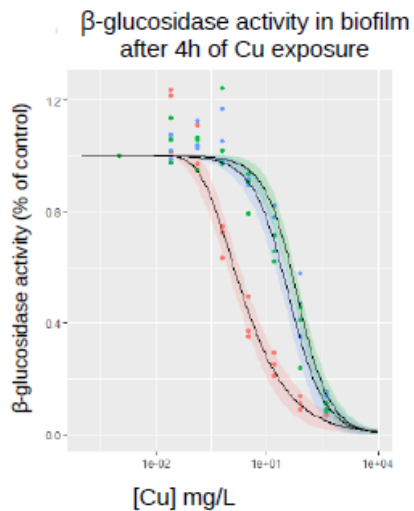


analysis and
monitoring



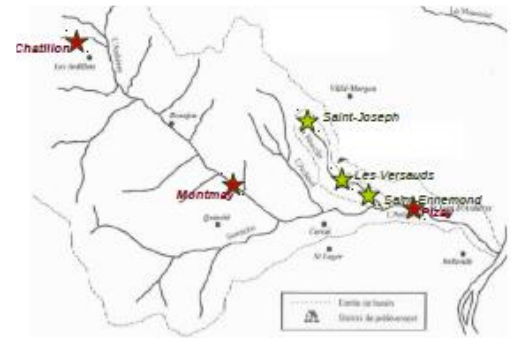
Example of a posteriori environmental risk assessment:

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



MALY / EMHA Ecologie Microbienne des Hydrosystèmes Anthropisés

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
- ❖ **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 !**