



Aims & Objectives

➔ The Information – Technologies – Environmental Analysis – Agricultural Processes (ITAP) joint research unit (JRU) leads the way in ICT research for agriculture and the environment, covering two disciplines:

- Life cycle assessment (LCA) as part of the Environmental Life cycle and Sustainability Assessment (ELSA) research group, which works on LCA for agro-bio processes. ITAP's LCA work focuses primarily on water and land management.
- Precision agriculture (PA) as part of the #DigitAg Convergence Lab (2017-2023), which aims to expand the use of digital technologies in agriculture. ITAP's work in PA Focuses primarily on vineyards.

➔ ITAP's houses Ecotech-Viti, a joint technology unit (JTU) with the Institute for Higher Education in Wine & Vine (IHEV) and the French Wine and Vine Institute (IFV) that explores how to make vineyards less dependent on plant protection products.



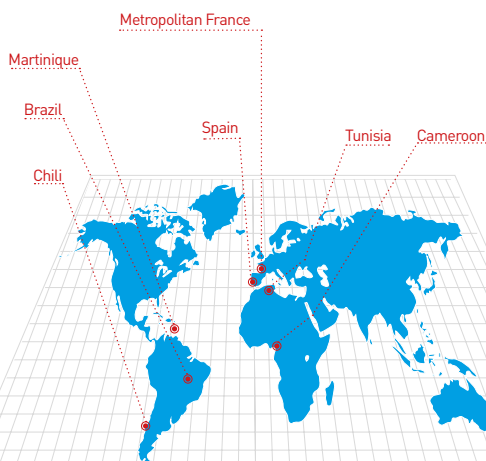
Linkage with IM2E research fields and emerging issues

ITAP's work spans two disciplines: "Metrology and innovative treatment processes", and "Water, actors and regions". Through its scientific and technical research, ITAP seeks to develop ways to assess the environmental and technical performance of products, processes and sectors. It also works on decision-making models and systems for sustainable agro-environmental processes.

ITAP's work also covers three challenges: "Water and agriculture", "Water preservation, savings and reuse through technological innovation", and "Risks, contaminants and health". The unit develops sensors to help characterise and optimise complex agricultural environments, as well as tools to limit pesticide use and reduce their harmful effects on the environment and on user and public health.



Study areas



Research teams involved into IM2E

Team Environmental and Social Assessment (ITAP-ELSA)

Led by:

LOISEAU Eléonore

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Team Agro-environmental modelling and decision-making (DéMo)

Led by:

TISSEYRE Bruno

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Team Optical Sensors for Complex Environments (COMiC)

Led by:

GOBRECHT Alexia

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Team Processes, Environment, Pesticides, Health (PEPS)

Led by:

RUELLE Bernadette

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PDA laser for measuring the speed and size of spray drops



EvaSprayViti (IFV/IRSTEA) : Assessment of agro-environmental performance of sprayers

highlights

Scientific and/or technical

● Thesis topic:

Development of a method to better differentiate between chronic and occasional discharges by accounting for the temporal dimension of eutrophication and freshwater ecotoxicity impacts in life cycle assessment (LCA)

Eva Risch

○ Cifre ○ co-tutelle

● Thesis topic:

Water footprint and LCA of water consumption impacts: development of indicators to measure the impact of water use on aquatic biodiversity.

Mattia Damani

○ Cifre ○ co-tutelle

● Thesis topic:

Development of a framework to consider water supply mix variations in LCA.

Susana Leão

○ Cifre ○ co-tutelle

● Thesis topic:

LCA-based environmental assessment of agricultural practices and conservation work on soil in the Oued Merquellil catchment (central Tunisia).

Mériem Jouini

○ Cifre ✓ co-tutelle

● Thesis topic:

APrecision agriculture at banana plantations.

Julien Lamour

✓ Cifre ○ co-tutelle

● Thesis topic:

Liquid sheet fragmentation and dispersion in the air: digital and experimental approaches.

Francisco Felis Carasco

○ Cifre ○ co-tutelle

Platforms and Equipments

The objective of the technological research platform RéducPol is to characterise agricultural spraying techniques and model air transfer methods to investigate how to reduce pesticide-related pollution. The platform features a vast, experimental wind tunnel to study drift, as well as an artificial vineyard to assess the agro-environmental performance of different vine spraying technologies and methods. RéducPol is able to assess performance at any scale, from an individual spray nozzle to a whole catchment. Its services include:

- characterising fragmentation and transport via laser diffraction particle sizing and velocity analysis (nozzle outlet profile and flow rate)
- assessing drift for different nozzle/plant protection product combinations and using fluorescent marking to study drift in real-life environments
- studying the agro-environmental performance of spraying methods and working with stakeholders to suggest improvements.



Academic and industrial partners

France

- CIRAD
- INRA
- Université de Montpellier
- Ecole des Mines d'Alès
- Université de Marseille
- France Université Numérique
- Heliospir
- CTIFL
- IFV
- Compagnie Fruitière
- BRL
- Société du Canal de Provence
- Suez
- Vinadeis
- SMAG
- ITK

Europe

- Université de Chieti-Pescara (Italie)
- Université de Bayreuth (Allemagne)
- Université de Saragosse (Espagne)
- KTH (Suède)

international

- Université de Talca (Chili)
- Université de Montevideo (Uruguay)
- CIFASIS (Argentine)



Examples of partnership projects

ANR ELSA-Pact project (2014-2018)

> ELSA-Pact is an industrial chair on life cycle assessment (products and sectors), bringing together researchers from Irstea, Cirad, SupAgro and École des Mines d'Alès, and industrial partners (BRL, Société du Canal de Provence, Suez, Vinadeis and Compagnie Fruitière). The chair develops tools to enable firms to assess their environmental and social impact, with a particular emphasis on water resource management.

#Digit.Ag Convergence Lab (2017-2023)

> The #DigitAg Convergence Lab is a joint initiative involving four research institutes (Cirad, Inra, Inria and Irstea), three higher education institutions (AgroParisTech, Montpellier SupAgro and the University of Montpellier), AxLR SATT, the Agricultural technical institutes of Acta network and eight private firms. Through its research, teaching and knowledge transfer work, the Convergence Lab aims to expand the use of digital technologies in agriculture and to foster the development of ICT and agricultural service companies.

ANR NEXT project (2015-2018)

> age treatment: monitoring sludge properties in situ.

Partners: Irstea TSCF, Armines, BPR France, Canada (ENDETEC, Tetra Tech, Real Tech, Carleton University). ITAP's goal, through this project, is to develop optical methods to characterise the rheological properties of sludge.

ITAP keywords:

Life cycle assessment
Environmental impact
Precision agriculture
Optical sensors
Chemometrics
Spectroscopy
Spatial technologies
Digital technologies
Exposure assessment
Hyperspectral imaging
Pesticides
Agricultural machinery

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