



INRAE

# Office français de la biodiversité

## POST-DOCTORAL POSITION

<b>Hierarchical category :</b>	A
<b>Job title :</b>	<b>Postdoctoral Researcher</b> <b>Modeling scenarios of pesticide fate and impact on biodiversity in vineyard landscapes</b>
<b>Posting :</b>	Direction générale déléguée Police – Connaissance - Expertise Direction de la Recherche et de l'appui scientifique Services Santé de la Faune et Fonctionnement des Ecosystèmes Agricoles et Anthropisation et fonctionnement des écosystèmes terrestres
<b>Hierarchical positioning :</b>	Reporting to the Head of the "Wildlife Health and Functioning of Agricultural Ecosystems" Department
<b>Administrative residence :</b>	OFB – site d'Auffargis-Saint-Benoist BP 20 78612 Le Perray-en-Yvelines
<b>Working residence :</b>	UMR INRAE Ecosys (Palaiseau, Saclay) or Lisah (Montpellier) Fixed-term contract (24 months). For its operational activities, the position
<b>Terms of employment :</b>	will mainly be localized at one of the two INRAE research sites involved in the project: UMR Lisah (Montpellier) or UMR Ecosys (Palaiseau - Saclay).

### DESCRIPTION OF DUTIES

#### Job description:

A major limitation of current risk assessment for pesticide products is its reliance on a substance-by-substance assessment while neglecting the risk posed by pesticide mixtures. A further complication is that even though pesticides are typically applied at the agricultural plot scale, emission sources and contamination routes much more concern the landscape scale and successively within and across years. To improve on current environmental risk assessment, reference scenarios of biodiversity exposure at the landscape scale are needed.

For this purpose, new exposure modelling approaches are needed that can better account for the fate of pesticides at the landscape scale and the likelihood of exposure given the ecological characteristics of each species (modes of exposure, dispersal, mobility between different habitats). Spatially-explicit models are powerful tools for achieving this vision as they can help identifying landscape features that are more likely to accumulate pesticide residues and can help infer species or groups of species that are most at risk in a given landscape context according to their ecological characteristics. Models for pesticide fate in vineyard agroecosystems are under active development at INRAE and allow to simulate the temporal and spatial variation in pesticide concentration in the air, soil and surface water within heterogeneous farmed catchment considering main landscape elements (farmed plot, hydrographic network, some field margins). The aim of this position is to mobilize these tools to determine how pesticides spread in typical vineyard landscapes while accounting for agricultural practices and landscape configuration. These scenarios will be crossed with agent-based models accounting for how different functional groups of organisms (e.g., detritivores, herbivores, insectivores and pollinators) disperse and move in the landscape as exemplified in ALMaSS approaches (Animal, Landscape and Man Simulation System).

#### Main activities:

- Based on comprehensive modelling of pesticide fate, identify the key processes involved and the landscape elements modulating them that need to be considered for an appropriate assessment of exposure in vineyard landscapes

- Defining a virtual vineyard landscape accounting for its different landscape features, agricultural practices and exposure mode of different functional groups within the landscape.
- Modelling the exposure of several ecological groups in the virtual landscape according to their dispersal capacities, habitat preferences and life-cycle characteristics.
- Derive a set of reference landscape exposure scenarios useful for implementing future regulatory environmental risk assessment schemes in vineyard context.
- Cooperate with the OFB and the two INRAE teams involved in this project and more generally with the various research teams involved in the PARC partnership of the task 6-4-4, within the specific project « Quantify effects of plant protection products and other stressors, through landscape risk assessment informing on environmental impacts ».
- Participating to meetings and activities of the PARC project (presentations, writing working documents, ...)
- Scientific valorisation of the researches by international publication(s)

## WORKING POSITION and RELATED RELATIONSHIPS

The position is a temporary employment for 24 months with an anticipated starting date in March 2024. You will employ by OFB and you will mainly work and host in an INRAE Research team.

The gross salary will be between 2400€ et 2800€ per month depending on the experience of the candidate (including social benefits and other taxes).

### Working conditions

**Within OFB:** As an OFB personnel, you will benefit from the scientific and administrative supervision provided by the two OFB researchers and teams involving in the project: Olivier Crouzet (expert in Agriculture and terrestrial ecotoxicology in the Santé-Agri research team) and Pierre-François Staub (expert in environmental pollution and its management, in the SAFET research team).

**Within INRAE:** You will work in very close collaboration with INRAE UMR Lisah (Montpellier) and UMR Ecosys (Palaiseau). You will work under the direct supervision of Cécile Dagès (Lisah) and Carole Bedos (EcoSys) with frequent interactions with other researchers on the modelling of pesticide fate in the environment (Pierre Benoit, Marc Voltz) or its impact on fauna (Colette Bertrand, Raphaël Royauté). The main location will be in INRAE Palaiseau (Campus Paris-Saclay) with few stays in INRAE Montpellier.

**External - international:** Interactions with other European PARC partners (e.g. workshops, laboratory visits) can also be organised.

### Background of OFB – INRAE relationships:

The Direction de la Recherche et de l'Appui Scientifique (or DRAS, for Department of Research and Scientific Support) is one of the OFB's two "knowledge" departments, in charge of research and expertise on biodiversity and ecosystems, their management, as well as on wildlife-related health risks. In particular, DRAS develops and support partnerships with research institutes, in order to foster the fulfilment of the biodiversity and water protection goals attached to several public policies, at French or European scales.

The OFB research department (DRAS) includes five units. The two units involving in this project are Santé-Agri (Santé de la Faune et Fonctionnement des Ecosystèmes Agricoles) and SAFET (Anthropisation et fonctionnement des écosystèmes terrestres). Santé-Agri unit aims at developing knowledge about interactions between agriculture and biodiversity, including issues on impact of pesticides on wildlife biodiversity. SAFET unit supports transversal research activities related to the characterization of the incidence of chemical pollution on biodiversity, with several projects also addressing the link between terrestrial and aquatic environments.

The National Research Institute for Agriculture, Food and the Environment, INRAE, is one of the closest scientific partners of OFB, their cooperation covering many topics related to the sustainable management of agro-ecosystem resources and biodiversity conservation, in the background of agro-ecological transition. The research units involve in this project are EcoSys (Écologie fonctionnelle et écotoxicologie des agroécosystèmes) and Lisah (Laboratoire d'Etude des Interactions entre Sol-Agrosystème-Hydrosystème).

OFB and INRAE are partners of the European research partnership for the assessment of the risks from chemicals (PARC, running over the 2022-2029 period). Especially, they will contribute to PARC activities relating to the impact of

pesticides on biodiversity (project 6-4-4 of PARC). This task aims at to develop and promote a more holistic environmental risk assessment of pesticides than the current regulation done, especially by considering landscape scale and mixtures issues.

## REQUIRED SKILLS AND QUALIFICATIONS

Applicants must hold a PhD degree in landscape ecology, ecotoxicology, or environmental fate of contaminants. Strong experience in modeling and spatialization are necessary.

Good knowledge in ecotoxicology, ecology, transfer physics and soil science and basic knowledges in environmental risk assessment and trait-based approaches would be an advantage.

Fluency with one or several programming languages such as C++, Python or similar is a prerequisite.

Applicants must be fluent in English.

## APPLY

The deadline for applications is January 31<sup>st</sup> 2024.

Interested candidates should send their applications (detailed CV and covering letter) on <https://ofb.gestmax.fr/2001/1/cdd-charge-de-recherches-en-ecotoxicologie-h-f>

Candidates can contact OFB supervisors before application: CROUZET Olivier [olivier.crouzet@ofb.gouv.fr](mailto:olivier.crouzet@ofb.gouv.fr) ; STAUB Pierre-François [pierre-francois.staub@ofb.gouv.fr](mailto:pierre-francois.staub@ofb.gouv.fr); or INRAE supervisors: Raphaël ROYAUTE [raphael.royaute@inrae.fr](mailto:raphael.royaute@inrae.fr) ; Carole Bedos [carole.bedos@inrae.fr](mailto:carole.bedos@inrae.fr).