



ARISTO – PhD Fellowship

ARISTO: The European Industry - Academia Network for Revising and Advancing the Assessment of the Soil Microbial Toxicity of Pesticides

PhD scholarship in soil microbial ecology (ARISTO)

Institut National de la Recherche pour l'Agriculture, l'Alimentation et l'Environnement (INRAE), Dijon, France and ECT Oekotoxikologie GmbH, Flörsheim am Main, Germany.

INRAE and ECT Oekotoxikologie GmbH are offering a PhD scholarship in pesticide soil ecotoxicology with expected commencement May 2021 or as soon as possible thereafter. The PhD will be enrolled in the doctoral school 'Environments – Santé' and will be awarded by the University of Bourgogne, France.

Project title: ESR7: Assessment of the toxicity of pesticide mixtures on soil microorganisms.

Project description of the PhD student

In soil, microorganisms are abundant and diverse and accomplish key functions supporting ecosystem services. They are interacting with other organisms living in soils forming complex interactions supporting soil food web. Exposure to pesticides applied to crops to control various pests can impact the abundance, diversity and activity of soil microorganisms as well as their interactions with macro-organisms. Although soil organisms are exposed to complex mixtures of pesticide residues, most of the studies to assess the ecotoxicity of pesticide towards soil microorganisms are still done *in silo* one active substance by one, not considering neither complex mixtures nor interactions with macro-organisms. Within this context, the two main objectives of the PhD student are (i) to identify and to develop methods, procedures and tools to assess the toxicity of pesticide mixtures on soil microorganisms and (ii) to assess the toxicity of pesticides on soil microorganisms and potential interactions with terrestrial macro-organisms. This work will be carried out using a lab-to-field experimental design with a two-tier scenario of exposure. Two microbial guilds (AOM and AMF) will be studied in details as well as their possible interactions with soil macro-organisms (arthropods or earthworms). Specifically, the PhD student will perform lab experiments with planted soil microcosms and field experiments for assessing the impact of pesticide mixtures on the abundance (qPCR), diversity (amplicon sequencing) and activity of these two microbial guilds and advanced biostatistics and bioinformatics analytical methods. The experimental process will involve collaboration with other fellows' projects (notably ESR8 working on the assessment of the toxicity of biopesticides on soil microorganisms) to provide a comprehensive scheme for assessing the ecotoxicity of complex mixtures of active substances of chemical and/or natural origin.

The PhD position is associated to a larger European training network, ARISTO, funded by the European Commission for 48 months. The ARISTO project offers 8 other PhD positions at other participating institutions. We strongly encourage candidates to also apply for other similar positions within the ARISTO network.

Principal supervisor: Dr Aymé Spor, ayme.spor@inrae.fr, +33-3 80 69 30 94, Dr Marion Devers, marion.devers@inrae.fr (co-supervisor), and Dr Jörg Römbke, ECT Oekotoxikologie GmbH, j-roembke@ect.de.

Planned secondments to Syngenta, Supervisor: Dr C. Screpanti, 2 months, purpose: training on pesticide risk assessment using data from pesticide mixtures experiments.

Brief description of ARISTO

ARISTO is an International Training Network (ITN) funded by the European Union's Horizon 2020 research and innovation programme under Marie Skłodowska-Curie grant agreement. Pesticides are major environmental pollutants. For this reason, the European Commission has imposed a stringent pesticide regulatory scheme for pesticides authorisation, where risk assessment for aquatic organisms and terrestrial macro-organisms is well defined. In contrast, the assessment of the toxicity of pesticides on soil microorganisms is lagging behind, still



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relying on an outdated protocol which fails to identify effects on key microbial functions and on microbial diversity, which can now be accurately determined through advanced and standardized methods introduced in soil microbiology in the last 10 years. EFSA identified soil microorganisms as an attribute to monitor during pesticides environmental risk assessment and stressed the need for novel tests to assess the toxicity of pesticides on soil microorganisms. **The ARISTO project will fulfil this scientific and regulatory gap through a unique doctoral program, based on the strong interaction of academia and industry, aiming to train the next generation of microbial ecotoxicologists.** These will produce benchmarking knowledge supporting the development of advanced tools and procedures, based on the response of key microbial indicator groups, for the comprehensive assessment of the toxicity of pesticides on soil microorganisms. ARISTO offers doctorate fellows a challenging training program build along 5 research objectives: (1) to develop pioneering *in vitro* tests, as a first conservative step, to assess the toxicity of pesticides on distinct ammonia-oxidizing microorganisms and arbuscular mycorrhizal fungi (2) to develop advanced lab and field tests to assess the toxicity of pesticides on natural soil assemblages of AOM and AMF, as a more realistic toxicity assessment step; (3) to develop an ecosystem-level toxicity assessment looking at pesticide effects at microbial networks and across different trophic levels along the soil food web (predator-prey); (4) to develop novel tools to determine the soil microbial toxicity of pesticide mixtures, and bio-pesticides; (5) to develop and validate advanced *in silico* tools for prioritizing pesticide transformation products with potential toxicity to soil microbes

Job description

The position is available for a period of 36 months on these terms. Your key tasks as a PhD student in ARISTO are:

- Participate in the research environment at the host institutions and the network activities of ARISTO
- Manage and carry through your research project
- Take PhD courses
- Write scientific articles and your PhD thesis
- Participate in congresses
- Teach and disseminate your research

Key criteria for the assessment of candidates

- A master's degree related to the subject area of the project
- The grade point average achieved should be more than 75 % of the maximum
- Professional qualifications relevant to the PhD programme: soil microbial ecology, bioinformatics, biostatistics, molecular biology
- Previous research publications
- Other professional activities
- Language skills: fluency in English

Formal requirements and eligibility

At the time of commencement, it is required that the candidate shall at the date of recruitment, be in the first four years¹ (full time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Furthermore, the candidate **must not** have resided or carried out their main activity (work, studies, etc.) in France and Germany for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account. The candidate is required to spend part of their project period at other institutions in the ARISTO consortium on secondments.

¹ is measured from the date when a researcher obtained the degree which would formally entitle him or her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited, irrespective of whether or not a doctorate is or was ever envisaged



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Terms of employment

Recruitment and Terms of appointment will be done according to the rules and regulations of the hosting institutions (50% of the total duration of 36 months at each beneficiary) and according to the rules and regulations laid down by European Union's Horizon 2020 Marie Curie Initial Training Networks. The stipend includes a living allowance (3270 €, adjusted by a country correction factor), mobility allowance (600 €) and family allowance (500 €), the latter allowance depending on the family status of the fellow.

Place of Employment

- **Institut National Recherche Agronomique (INRAE)**, Department of Agroecology, Dijon, FRANCE, Website: https://www6.dijon.inrae.fr/umragroecologie_eng/
- **ECT Oekotoxikologie GmbH**, Böttgerstrasse 2-14, 65439 Flörsheim-am-Main, Germany Website: <https://ect.de/>

Please notice that this PhD fellowship involves a split PhD studentship between an academic and an industrial partner. Hence the selected fellow will have to spend 18 months in the premises of the INRAE and 18 months in the premises of ECT Oekotoxikologie GmbH, while the fellow will also spend time to other partners through short secondments, see above.

Application Procedure

The application, in English, must be submitted by mail to ayme.spor@inrae.fr, personalabteilung@ect.de and the coordinator dkarpouzas@uth.gr.

Please include

- Motivation Letter, stating which PhD project you are applying, why you want to pursue a PhD career in academic and industrial sectors, and to what extent does the given project complies with your skills and ambition
- A statement if (and which) you have applied for other ARISTO PhD fellowships
- Full CV including studies, research experience, work experience and publications if any
- Diploma and transcripts of records (BSc and MSc)
- 3 professional referees (Name, address, telephone & email)
- Documentation of English language qualifications

The INRAE and ECT Oekotoxikologie GmbH wish our staff to reflect the diversity of society and thus welcomes applications from all qualified candidates regardless of age, gender, race, religion or ethnic background.

The deadline for applications is 20.01.2021. Applications received later than this date will not be considered.

Recruitment Process: After the expiry of the deadline for applications, the project manager will provide all applications to the members of the recruitment committee. A recruitment sub-committee for this position composed of the members of the Supervisory Committee (Academic Supervisor, Industrial Supervisor and Secondment Supervisor) will evaluate all applications and select the best three candidates based on the quality of the candidates' previous training, qualifications and skills (as listed above), CV and their motivation for the research topic. The best three candidates will be interviewed by the recruitment committee which will select the best applicant for the position taking into consideration the recommendation of the co-supervisors for the position. The applicants will be notified of the final selection by the Project Manager and will be given 7 days to accept or decline.



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Questions

For specific information about the PhD scholarship, please contact the principal supervisor Aymé Spor (ayme.spor@inrae.fr) and Jörg Römbke (j-roembke@ect.de).