A Two-year postdoctoral position available at INRAE Palaiseau / Paris-Saclay University, France in the frame of a collaborative project with the company BASF

Functional characterization of molecular determinants involved in atypical gene-for-gene interactions between rapeseed and its fungal pathogen *Leptosphaeria maculans*

The EPLM team of the BIOGER Institute dedicated to fungal pathogens of crops (UR BIOGER INRAE - University Paris-Saclay) is looking for a postdoc with experience in molecular plant-pathogen interactions and/or plant molecular biology to join us on a collaborative project with the private company BASF.

Research: Our group is interested in the molecular interactions between rapeseed and its most important fungal pathogen, *Leptosphaeria maculans*. One of our research projects focusses on the interactions between fungal avirulence effectors (AvrLm proteins) and plant resistances (Rlm proteins). Twelve Rlm - AvrLm interactions have been characterized in this pathosystem, highlighting complex interactions that differ from classical gene-for-gene interactions. Adding a new level of complexity, recent preliminary results revealed atypical interactions between some *L. maculans* isolates expressing the avirulence effector gene *AvrLm4-7* and some rapeseed genotypes carrying the resistance gene *Rlm7*, with the appearance of a necrotic lesion followed by a late resistance, allowing to block the infection. Based on this, the INTERpOSE project aims to explore the genotypic and phenotypic diversity associated with AvrLm/Rlm interactions in order to identify the molecular determinants involved in the establishment of atypical recognition phenotypes that could be exploited as sources of durable resistance exerting less selection pressure on pathogen populations. The INTERpOSE project will answer the following questions: (i) What is the genotypic diversity at the avirulence and resistance loci?; (ii) What is the phenotypic diversity observed during interactions between avirulence and resistance proteins and, in case of intermediate phenotypes, what are the underlying molecular mechanisms? and (iii) Can we identify protein regions of avirulence and resistance proteins involved in the establishment of intermediate phenotypes? The project will take advantage of the acknowledged expertise in fungal genomics / effector biology of the EPLM team and of the high-throughput technologies developed by the industrial partner BASF to screen for resistance sources and intermediate phenotypes in a collection of diverse Brassica materials. The Postdoc scientist will be in charge of exploring the allelic and phenotypic diversity associated with the AvrLm / Rlm interactions including atypical interaction phenotypes, and of searching, through structure/function analyses, for the protein regions involved in these atypical interactions.

Environment: The successful applicant will join the EPLM team (6 scientists, 3 technicians / assistant engineers and 2 PhD students). We offer a scientifically stimulating environment with access to state-of-the-art infrastructures, including plant and fungus growth facilities as well as equipment for molecular biology, protein biochemistry, bio-informatics analyses and cell imaging. The new AgroParisTech –Paris-Saclay University Campus of Palaiseau (91) is an acknowledged center for research in agronomy / agro-ecology located 25 km from Paris. During the project, the post-doc will spend one month per year at the BASF Innovation Center in Ghent (Belgium).

Requirements/Qualifications: We are looking for a talented Postdoc scientist with demonstrated experience in research topics related to molecular plant-microbe interactions and/or plant molecular biology. Expertise in microbiology or plant biotechnologies would be acknowledged. Excellent English communication skills are expected. Great emphasis will be placed on personal qualities such as creativity, motivation and ability to work in a team.

Duration & starting date: The appointment will be for two years. The salary is depending on experience. The starting date is September 2024 at the earliest but may be postponed if necessary.

Application: If interested, please contact Isabelle Fudal (Isabelle.Fudal@inrae.fr) and Remy Adriaensen (remy.adriaensen@basf.com). Provide a single PDF containing a CV and a brief statement of research interests and qualifications, and arrange to have two letters of recommendation sent. Review of applications will begin immediately and will continue until a suitable candidate is found.

Relevant publications:

- Talbi N, et al. (2023). The neighboring genes AvrLm10A and AvrLm10B are part of a large multigene family of cooperating effector genes conserved in Dothideomycetes and Sordariomycetes. *Mol. Plant Pathol*. https://doi.org/10.1111/mpp.13338
- Balesdent MH, et al. 2022. Twenty-years of Leptosphaeria maculans population survey in France suggest pyramiding Rlm3 and Rlm7 in rapeseed is a risky resistance management strategy. Phytopathology 112:2126-2137. https://doi.org/10.1094/PHYTO-04-22-0108-R
- Lazar N, et al. (2022) A new family of structurally conserved fungal effectors displays epistatic interactions with plant resistance proteins. *PLOS Pathog* https://doi.org/10.1371/journal.ppat.1010664
- Jiquel A, et al. (2021) A gene-for-gene interaction involving a 'late' effector contributes to quantitative resistance to the stem canker disease in *Brassica napus*. New Phytol. 231:1510-1524. https://doi.org/10.1111/nph.17292