

**Post-doc position for two years**



**Resistance genes diversification strategies to manage plant pathogens in agro-ecosystems: theoretical approaches and application to French vineyard landscapes**

**Context:** Increasing crop diversity, especially disease resistance genes, is a corner-stone of agroecology. However, pathogens have the ability to evolve and overcome such resistances. This often occurs quickly after resistance is deployed in the field, resulting in significant crop losses and increasing pesticide use. How resistance is deployed spatially and temporally can impact on the rates of pathogen evolution and resistance breakdown: resistance genes can be combined in the same plant cultivar (pyramiding), in different plants of the same field (mixtures) or different fields (mosaics), or they can be deployed periodically (rotations) [1,2]. Many questions remain open: Which strategy choosing? At what spatial scale? Do these choices depend on the characteristics of the pathogen and its plant host?

**Project:** The main objective is to extend our understanding of the epidemiological and evolutionary outcomes of the main resistance deployment strategies. More specifically, we aim to assess the influence of pathogens life-history and genetics of interaction with plant resistance on the performance of deployment strategies. The theoretical developments will benefit from the R package *landsepi* [2,3] and will be applied to the deployment of downy-mildew resistant vine varieties on the wine-growing territory of the cooperative winery "[Nous les vignerons de Buzet](#)". Phenotyping data on the life history traits of downy-mildew populations on a range of grape varieties are already available [e.g. 4] and will be complemented during the course of the project.

**Your background:** We seek a young researcher who combines a strong conceptual background in epidemiology / evolutionary biology and modeling skills (mathematics and/or computer science). Experience with programming (R / C++) and population genetics is required. Skills in spatial data analysis are not necessary but will be appreciated.

The post-doc fellow will work in a multidisciplinary team gathering researchers interested in epidemiology, plant pathology, evolutionary biology and economy. He/she will take an active part in discussions on the co-construction of deployment scenarios with the technicians of cooperative cellars. He/she will be in charge of the scientific valorization of the results and will be able to get involved in their scientific popularization (the project has funding to produce a web-documentary / cartoon).

**Term and location:** The position should start no later than December 1, 2020. Support is for two years. Net month salary will about 2100 euros (including health insurance and unemployment insurance). This position is co-supervised by Frédéric Fabre (UMR SAVE), Adeline Alonso Ugaglia (Bordeaux Sciences Agro), Loup Rimbaud (UR PV) and Julien Papaïx (UR BioSP). The postdoctoral fellow will be based in Bordeaux (UMR [SAVE](#)) with several missions to Avignon (UR [BioSP](#)).

**How to apply:** Please email a letter of motivation, CV, and names and contact details of two referees as soon as possible but no later than July 15th, 2020 to [frederic.fabre@inrae.fr](mailto:frederic.fabre@inrae.fr) and [loup.rimbaud@inrae.fr](mailto:loup.rimbaud@inrae.fr).

**Bibliography:** [1] Djidjou-Demasse R, B Moury, F Fabre. 2017. [New Phytologist 216, 239-253](#). [2] Rimbaud L, J Papaïx, LG Barrett, JJ Burdon, PH Thrall. 2018. [Evolutionary Applications 11, 1791-1810](#). [3] Rimbaud L, J Papaïx, JF Rey, LG Barrett, PH Thrall. 2018. [Plos Computational Biology, 14, e1006067](#). [4] Delmas CEL, F Fabre, J Jolivet, ID Mazet, SR Cervera, L Delière, F Delmotte. 2016. [Evolutionary Applications 9: 709-725](#).