

Internship 2019-2020 Master 2 (6 months)

Title of the internship : The microbiological terroir of vine plants : a biogeographic analysis

Supervisors :

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Institute:

Université de Rennes 1, CNRS, UMR6553 ECOBIO.

Summary :

The multicellular organisms (i.e. macroorganisms) are all colonized by microbes. No exception are known so far in nature (Morris et al., 2019). All macroorganisms are forming symbioses (beneficial, neutral or negative relationships) with microorganisms. It has been repeatedly shown that the symbionts of a given host do deeply impact the realized phenotype of both animals (e.g. Rosenberg et al., 2010; Blanton et al., 2016) and plants (e.g. Vandenkoornhuysse et al., 2015). In plants, the inner microbiota impacts the plant nutrition, helps to buffer the environmental stresses (Vannier et al., 2015), and contribute to the plant health by preventing the growth or activity of plant pathogens. A large fraction of this microbiota is acquired horizontally (i.e. from the surrounding plant microbial reservoir). The understanding of the drivers of the plant microbiota heterogeneity is a hot topic.

Microbial biogeography, the study of microbial biodiversity over time and space, uncovers the role that geospatial dispersion patterns is playing (Martiny et al., 2006). *Vitis vinifera* (vine plant) represents an economically and culturally important agricultural crop for which microbial activity plays critical roles in both grape and wine production. Regional variation in grape- and wine-quality characteristics is a critical feature of perceived product identity (*terroir*) (Bokulich et al., 2013; Gilbert et al., 2014). We are thus formulating the hypothesis H(1) of an existing biogeographical pattern of microbial spatial distribution.

Temperature, humidity, precipitation, soil nutrient concentrations, pH, solar radiation, can have a significant impact on the biogeography of the bacteria and fungi. To address the biogeographic pattern, the work will be developed at Margaux AOP, because this area is supposed to be homogeneous in term of soils characteristics.

Thus these environmental parameters having an expected limited effect, we will test the hypotheses that H(2) the microbial biogeography in vineyards is conditioned by the host plant cepage and age.

The internship will focus on the analysis of the microbiological terroir of vine plant by analysing the root associated microbiota. This internship will include molecular work and data analyses.

Trainee skills : Ecological concepts (biogeography, assemblages of communities), molecular biology (PCR), statistics (R, temporal & spatial analyses), rigour (numerous samples).

Other informations :

Insertion within an ongoing research project (yes/no) : Yes,

If yes, provide informations ?

PhD project CIFRE 2018-2021 (Université de Rennes 1 & Château Palmer, Sovivins, Pépinière de Salettes)

Publications on the field of research involving people of this project (up to 3) :

Bittebiere AK, Mony C, Maluenda E, Gareil A, Dheilly A, Coudouel S, Bahin M, Vandenkoornhuysse P (2019) Past spatial structure of plant communities determines arbuscular mycorrhizal fungal community assembly. *Journal of Ecology*, in press

Vandenkoornhuysse P, Quaiser A, Duhamel M, Le Van A, Dufresne A (2015) The importance of the microbiome of the plant holobiont. *New Phytologist* 206: 1196-1206

Vannier N, Mony C, Bittebière AK, Michon-Codouel S, Biget M, Vandenkoornhuysse P (2018) A microorganisms' journey between plant generations. *Microbiome* 6:79 .