Do we need to consider grape phyllosphere microbiome in breeding schemes?

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Abstract

The aerial surface of the plant (phyllosphere) is the habitat of complex microbial communities. These communities may have profound effects on host plant health and its performance traits.

When breeding new cultivars, i.e. the aerial component of a grape plant, one can simply ignore the phyllosphere in breeding schemes if it's composition is mainly dependent on the environment or consider it as an important component if the genotype is the main driver of the phyllosphere composition. In order to answer this question, we have analysed several factors influencing the phyllosphere microbial community structuring. Using amplicon sequencing of the 16S rRNA gene and of the internal transcribed spacer (ITS), we explored the microbial diversity at genus level for both bacteria and fungi present in the phyllosphere of leaves and grape berries. We analysed it on different grape taxonomic level (between 5 *Vitis* species ora set of *Vitis vinifera* cultivars chosen to represent the 3 genetic pool of the species), for different years and on five commercially important varieties of Vitis vinifera that were sampled from three different French terroirs. Our results indicated the presence of complex microbial diversity and assemblages in the phyllosphere and the presentation will describe the observed diversity. A significant effect of several factors (organ, grape species, growing year and terroir) on taxa abundance was observed with varying degrees of effect. At a given location, genotypes have an impact on microbial assemblage in the phyllosphere of leaf and berries, most pronounced on fruits but the effect of terroir was much stronger than the cultivar identity when the leaf phyllosphere of five grapevine varieties grown in different agro-climatic zones was compared. Limitations of the study as well as implied consequences of this work will be discussed.

Keywords: Biotic interactions, Phyllosphere microbiome, amplicon sequencing, extended ideotype