Will grapevine pathogens adapt to climate warming? Temperature reaction norms of life-history traits in grapevine downy mildew

C.E.L. Delmas[1], L. Delière[1], F. Delmotte[1]
[1]*INRA, UMR 1065 SAVE, Villenave d'Ornon, France*

Plant pathogens are a significant constraint to agriculture and are challenged, along with their hosts, to climate changes. While the influence of climate on pathogen impacts on their hosts have been reviewed (Garrett et al., 2006), pathogen adaptation to climatic changes is still unclear. However, the adaptive potential of plant pathogens to abiotic conditions is one of the most important predictors of the magnitude of climate change impact on agro-ecosystems (Garrett et al., 2006). Despite the applied importance of studying the response of grapevine pathogens to climate warming, we still lack experimental data on current adaptation to temperature and pathogen's evolutionary potential facing climate changes.

We conducted a common garden experiment using populations of the biotrophic grapevine pathogen *Plasmopara viticola* collected on Chardonnay in northern and southern vineyards showing contrasted climatic conditions. Clonal replicates of 70 genetically distinct isolates were assessed for aggressiveness (quantitative traits of pathogenicity) at 12°C, 18°C and 24°C.

We found highly significant phenotypic plasticity to temperature of northern and southern populations, significant genetic adaptation especially in the cold environment and significant 'genotype x temperature' interaction. We analysed reaction norms for a range of quantitative traits of pathogenicity and performed a quantitative genetic analysis (Q_{ST} vs. F_{ST}) to understand the evolutionary processes underlying these results. Our findings show that grapevine downy mildew has a high genetic variation with high plasticity for temperature, which is therefore unlikely to limit its adaptation to climate warming.

Acknowledgments: This study has been carried out with financial support from the French National Research Agency (ANR) in the frame of the Investments for the future Programme, within the Cluster of Excellence COTE (ANR-10-LABX-45). This study was also supported by the FP7 - European Commission ("Innovine", FP7/2012–2013: FP7-311775).

References :

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