



Are patterns of *Populus nigra* geographical differentiation for resistance to *Melampsora larici-populina* dependent of genetic variation of the pathogen populations?

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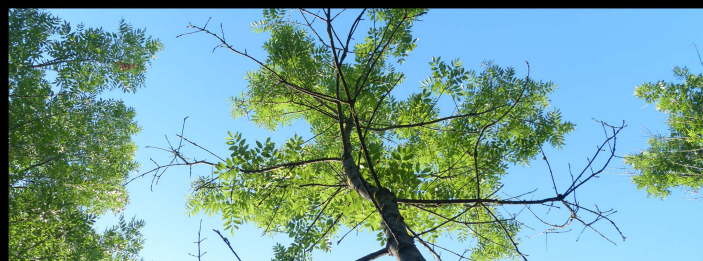
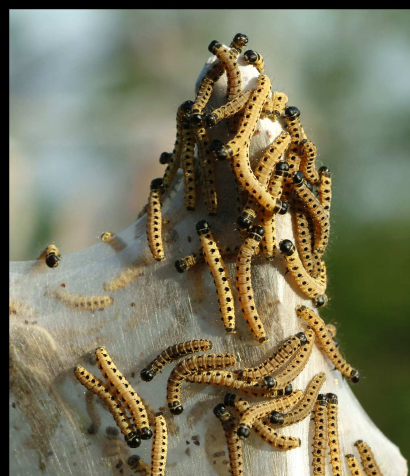
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Are patterns of *Populus nigra* geographical differentiation for resistance to *Melampsora larici-populina* dependent of genetic variation of the pathogen populations?

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Breeding poplars for more durable resistance to *Melampsora larici-populina* (*Mlp*) leaf rust is a real challenge, especially in an European context where *Mlp* populations exhibit high genetic diversity in black poplar-larch sympatric areas and where selective pressures from the domesticated interspecific host (*P. xeuramericana* and *P. xinteramericana*) are both rapid and strong. Several approaches combining field evaluation under natural infection and artificial inoculation tests with control of the pathogen diversity were more recently directed at the study of genetic variation for partial resistance (QR), in the co-evolved parental species *P. nigra* L. Quantitative genetic studies of the genetic control of partial resistance were developed on one association population composed of more than 800 clones from European natural populations and genotyped with more than 8,000 SNPs. The existence of a large reservoir of variation for QR in different natural populations of *P. nigra* was demonstrated for several epidemiological parameters, with some evidence of geographical patterns. Significant variation for strain-specificity was observed at clonal level within a subset of high field-resistant natural poplar genotypes. The characterization of selection pressures exerted by host resistance on pathogen population provides useful insights into the dynamics of host-parasite co-evolution processes and is crucial for the design of both breeding and deployment strategies. Preliminary experiments suggested local adaptation of *Mlp* populations to partial resistances present in *P. nigra* populations. All these results will be discussed in the framework of poplar breeding strategies and poplar cultivar deployment.

Keywords

Poplar breeding, *Populus nigra* L., *Melampsora larici-populina* Kleb., leaf rust resistance, partial resistance, strain-specificity