Recent advances on peach-brown rot interactions from INRAE's research program

Bénédicte Quilot-Turion

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Brown rot caused by *Monilinia* spp. provokes dramatic losses of peach in all production regions. Thus we search solutions to fight in sustainable ways against this disease. Compounds produced by fruit, through constitutive synthesis or *de novo* response to stress, may play a role in controlling the infection. In the past years, we explored different ways to gain in knowledge on fruit defense against brown rot and progress towards the definition of fruit that could be more tolerant to this disease.

First, we explored phenolic and triterpenoid diversity of fruit skin together with brown rot resistance. A Brazilian peach collection and an interspecific cross between *P. davidiana* and *P. persica*, each of 120 genotyped individuals, have been screened for 3 years, for susceptibility to *M. fructicola* and to *M. laxa* respectively. Some genotypes of the two populations showed low or null infection the 3 years. Correlations between compounds and infection traits led us to hypothesize that some compounds from peach skin could play a role in the brown rot control.

Second, we tested the fungicide activity of different compounds *in vitro*. The effect of chlorogenic acid (ACQ) on *M. fructicola* pathogenic capacities was tested in liquid culture and HPLC, proteome and RT-qPCR analyses were conducted. The observations indicated that ACQ or its derivates can modify pathogenetic factors by modulating gene expression resulting in a modification of enzyme secretion. In addition, the impacts of triterpenoid and peel extracts on growth, sporulation and germination were tested on Petri dishes and the expression of virulence genes examined.

At last, we investigated the effect of wounding the fruit on a subsequent infection, suspecting that the synthesis of new compounds after an injury can impede the fungi attack. We performed a series of experiments to study the composition of the skin after injury and in case of inoculation immediately after wounding and seven hours after wounding. Phenolic and terpenoid compounds were identified in the skin by HPLC analysis and volatile compounds were detected by GC-MS analysis. In addition, RNAseq analyses highlighted pathways activated after injury. Some of the compounds produced after injury may play an active role in plant-pathogen relations and/or activation of metabolic pathways involved in the susceptibility/resistance of peach to *M. laxa*.

All together, these experimentations underlined the impacts of some compounds on different factors of *Monilinia* spp. involved in pathogenicity, paving the way for breeding strategies.