White and grey molds, where do you come from? A comparative study on inoculum of B. cinerea and S. sclerotiorum

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A comparative study on inoculum of *B. cinerea* and *S. sclerotiorum*.

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One way to move towards an agriculture that is friendlier to the environment and human health is to optimize the protection of plants against polyphagous diseases. Such progress would involve localizing inoculum sources and the pathway of spores in the atmosphere. However, this task can be challenging, especially if inoculum can originate from different potential sources, such as in grey or white mold caused by *B. cinerea* (*Bc*) and *S. sclerotiorum (Ssc*), respectively.

We collected several hundred isolates of *Bc* and *Ssc* from air and field samples (including both, soil and plant material). We genotyped them and estimated their relatedness to decipher the type of inoculum that causes the symptoms on plants. Moreover, we integrated quantitative data, genetic characteristics, climatic parameters and air mass trajectories to assess if the airborne inoculum had a local or distant origin.

The genetic characteristics did not differ significantly among isolates of *Ssc* collected from air, soil and carrots. Moreover, the genetic differentiation between lettuce and soil isolates of *Bc* decreased over three successive lettuce crops. However, there was no significant correlation between the abundance of *Bc* soilborne inoculum and subsequent disease incidence on the crop. For both crops it seems that the disease was initiated by airborne and by soilborne inoculum.

Viable inoculum of *Bc* and *Ssc*, can be detected from air samples almost throughout the year (96 % and 80% of the sampling days, respectively) even when no susceptible crop was located in the vicinity of the sampling sites. The abundance of this inoculum was significantly correlated with several local climatic parameters. For *Bc,* the variation in abundance and genetic characteristics tended to be linked to the origin of the air masses. For *Ssc*, there was low or no genetic differentiation between isolates collected from four different sites. 700 km could separate collection sites that shared airborne isolates with the same haplotypes. This situation was compatible with the hypothesis of a distant origin of inoculum. Moreover, the results suggest that aerial interconnectivity may be a key to assessing exchanges of isolates between regions.

For both fungi, at the local scale, soilborne and airborne inoculum may be involved in disease development. Sources of airborne inoculum seemed to be local without excluding arrival of spores from distant locations. All these parameters should be considered in order to optimize plant protection.