P.17 - How does wheat canopy development influence Septoria tritici epidemics?

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We aim to better understand how canopy architecture influences foliar disease epidemics and to help identify canopy traits that limit disease development. We have focused on the case of Septoria tritici, which is presently one of the most damageable wheat foliar diseases in Europe. Several field studies have pointed out that canopy architecture may influence S. tritici development. It has been suggested that such a process may be exploited in order to favour disease escape. We have developed an approach combining modeling and experiments. A wheat architectural model has been coupled with a S. tritici model. Given the complexity of the interactions, the model was used to decompose, step by step, how the dynamics of crop development influence disease development, and to identify the key variables involved in the plant-pathogens interactions. Sensitivity analysis was then done to compare the effects of different architectural traits on the development of epidemics. Different field trials were set up in which sowing density and/or nitrogen regimes were varied to obtain different canopy architectures. Comparison between simulated epidemics and actual field epidemics allowed for dynamic interaction between experimental and modeling work and led to propositions for orienting future observations to better characterize disease-canopy structure interactions. We hope that our approach, by revealing interactions between canopy structure and disease development, and also traits of canopy architecture that promote disease escape, will be of interest for evaluating the effects of agricultural practices on epidemic development and for designing wheat ideotypes.