Investigating the induction of antimicrobial compounds produced by biocontrol strains of *Pseudomonas ssp*. upon exposure to *Phytophthora infestans*

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Bioactive compounds produced by biocontrol strains have shown great results against many highly damaging pests endangering our crop production such as the late blight causing agent *Phytophthora infestans*. Studies concerning the potential of biocontrol against *P. infestans* did mainly focus on the directly visible effects of the molecules produced by the selected microbes but did not include the potential communication occurring between the pathogen and the microbial strains, which could lead to specific induction of *P. infestans* inhibiting compounds. Investigating the communication aspect of the induction of molecules of interest will give us important insights into the underlying mechanisms of the interaction and could be essential for an effective application of biocontrol solutions in the field. For this thesis, *Pseudomonas* bacteria were used, as previous studies in our lab revealed the production of multiple molecules of interest with *P. infestans* inhibiting properties. Examples of such compounds of high interest are the anti-oomycete volatile 1-undecene, the broad-range respiratory volatile toxin hydrogen cyanide and the diffusible siderophore pyoverdine. To investigate this question of communication, different approaches were used. In a first step, both the pathogen and the biocontrol strain were placed in a closed system enabling unidirectional exposure of one partner to the other. The volatiles produced by bacteria exposed to the volatiles from the pathogen were collected and analyzed by gas chromatography coupled to mass spectrometry (GCMS) and checked for increased production of the compounds compared to unexposed bacteria. The obtained results showed increased emission of 1-undecene in exposed bacteria, which warrants further investigation. In addition to the volatile analysis, the expression of genes encoding the compounds of interest was tested for changes between exposed and unexposed bacteria, but no consistent changes could be observed. Using fluorospectrometric measurements, we observed that bacteria exposed to the volatiles or directly to the zoospores of *P. infestans* increased pyoverdine production when grown in liquid solution. In view of the importance of siderophores in the inhibition of plant pathogens by competing microbes, these results clearly demonstrate the importance of microbial communication in the production of desirable compounds in biocontrol bacteria.

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