

## Volatiles emitted by *Pseudomonas* as bacterial agents against *Phytophthora infestans*

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The oomycete *Phytophthora infestans*, the causal agent of late blight, is a major potato pathogen. The combined indirect costs for controlling late blight and the direct costs due to yield losses are estimated to be in the range of one billion Euros annually. Currently the control of late blight relies on a massive application of pesticides. As evidence accumulates that pesticides have multiple negative effects on both the environment and human health their usage faces increased societal aversion.

In recent years an increasing number of studies focused on elucidating the influence of the plant microbiota on plant health. In this context the potential of bacterial volatile organic compounds (VOCs) to strengthen the plant immune system or to suppress pathogens has been investigated. Recently different VOCs emitted by *Pseudomonas* with a strong potential to inhibit *P. infestans* directly have been identified.

In our study we found that the volatiles emitted by different *Pseudomonas* strains could inhibit strongly *P. infestans in vitro*. However, this inhibitory effect varied greatly depending on the culture conditions of the bacteria. Results obtained with mutant strains of *Pseudomonas* lacking the locus for hydrogen cyanide also indicate that hydrogen cyanide was the pivotal volatile in the bacterial blend that mediated the observed inhibitory effect.

Testing the potential of distinct sulfur-containing volatiles to inhibit *P. infestans* it could be shown that volatile application of S-Methyl methanethiosulfonate (MMTS) could protect *in vitro*-grown potato plantlets from infection by zoospores of *Phytophthora*. Under application of MMTS no disease symptoms were visible macroscopically. Importantly, analysis of the volatilome from different *Pseudomonas* strains by GC-MS revealed that inoculating sterile potato leaves with *Pseudomonas* led to the production of MMTS.

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