

# Protective Potential, Range of Action and Applicability of S-Methyl Methanethiosulfonate for Sustainable Crop Management

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Master thesis in Biology, Pflanzen- und mikrobielle Wissenschaften

The Master thesis is a scientific project carried out by a Charlotte Joller under the supervision of Prof. Laure Weisskopf, Dr. Delphine Chinchilla and Dr. Mout De Vrieze within the research group of Laure Weisskopf in the Department of Biology.

In this Master thesis the protective potential of a very promising sulphur containing volatile organic compound (SVOC) for *Phytophthora infestans* management, S-methyl methanethiosulfonate (MMTS), against different fungi, bacteria and *P. infestans* was evaluated by means of *in vitro* growth assays and *in planta* infection assays. The relative inhibition potential of this compound against phytopathogens pathogens was, furthermore, compared to dimethyl disulfide and dimethyl trisulfide, other SVOCs prominently found in bacterial volatile bouquets and known for their anti-microbial characteristics. Inspired by very promising *in planta* results demonstrating remarkable capacities of MMTS to inhibit diseases induced by *P. infestans* in particular, the applicability of this SVOC for sustainable disease management in the field, was, moreover, investigated by determination of its range of action against various organisms. Finally, in view of the rather broad range of action observed in toxicological assays, pure application of MMTS was rejected as an environmentally friendly disease management strategy. Instead, its potential for crop protection as a component within bacterial volatile emissions was considered. In that aim, changes in anti-oomycete activity and SVOC emission by bacteria upon complementation of the growth medium with a biosynthetic precursor of many sulphur volatiles, including MMTS, was analyzed by *in vitro* growth assays as well as gas chromatography and mass spectrometry. Results show a clear correlation between enhanced SVOC production and increased anti-oomycete activity of bacterial volatiles upon medium complementation. This underlines the importance of the availability of specific metabolites to biocontrol agents for antimicrobial activity and opens up new perspective for future research, for volatile mediated pest control with sulphur compounds in particular.

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