

Antimicrobial Activity of Essential Oils Against *Phytophthora infestans*: Potential Application on Potato Plants

Neda Najdabbasi^{1,2*}, K. Dewitte¹, S. M. Mirmajlessi¹, M. Mänd², Kris. Audenaert¹ and G. Haesaert¹

¹Department of plants and crops, Ghent University, Belgium

²Department of Plant health, Estonian University of Life Sciences, Estonia

Potato late blight, a disease caused by the Oomycete *Phytophthora infestans* (Mont.) de Bary, is one of the most destructive plant diseases worldwide. The high cost as well as the environmental impact of fungicides-based strategies in combination with the rapid evolution within the *P. Infestans* population towards more virulent and more resistant patho types to fungicides is other crucial threats in potato production. Currently, used fungicides are not completely able to control the pathogen, thus environmentally friendly alternative control strategies need to be researched. Today, essential oils (EOs) can play an important role in addition to conventional fungicides to control plant pathogens. They represent a new class of crop protectants with such suitable effects like short shelf-life and low toxicity on the environment.

The aim of this study was to examine the anti-microbial activity of four pure Eos including; clove oil (*Syzygium aromaticum*), juniper oil (*Juniperus communis*), tea tree oil (*Melaleuca alternifolia*) and thyme (*Thymus vulgaris*) against *P. Infestans* mycelial growth as well as their effects on disease severity on potato leaves. The products were tested at five different concentrations (6.66, 3.33, 1.66, 0.83 and 0.41 $\mu\text{L mL}^{-1}$) and compared to an untreated control. The efficacy of each EO was evaluated based on mycelia growth measured by colony diameters in amended media in three replicates. Also, the disease severity index (DSI) was assessed in a detached leaf essay after applying different EOs emulsions on the leaves of a susceptible potato cultivar (cv. Bentje). Results of the current study showed significant differences ($P < 0.05$) for the different concentrations tested for each EO and between different EOs with different concentrations. Clove, tea tree and thyme EOs showed *in vitro* desirable inhibitory effect against *P. Infestans* mycelial growth, whereas clove and thyme EOs exhibited considerable protection against pathogen development on potato leaves. In addition, these two Eos showed no sign of toxic effects on potato leaves based on phytotoxicity assessments.

Keywords: Late blight, *Phytophthora infestans*, essential oils, phytotoxicity.

Biography:

Neda Najdabbasi, is a joint PhD student between the department of plants and crops, Ghent University (UGent) in Belgium and the department of plants health, Estonian University of Life Science (EMU), in Estonia.

Her PhD research focuses on defense priming in potato plants against the pathogen *Phytophthora infestans* as an alternative biological control method. So, it encompasses wide range of experiments including pathogenicity tests, measuring volatile profile of potato plants based on GC_MS analyses and characterization of defense genes expressed. Besides, some other alternative priming methods such as using antagonists, essential oils, plant extracts and potassium phosphate against *P. infestans* will be investigated.