

Development of a novel natural-based product as a miticide and fungicide, using *Tetranychus urticae*, *Cladosporium herbarum*, and *Botrytis cinerea* as test organisms

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Background

Insects and mites present a significant threat to global economies through crop damage and causing adverse effects on human health. Synthetic pesticides are most often used to control such pest species. However, the long-term and extensive use of synthetic pesticides can impact human health, disrupt ecosystems and harm other beneficial organisms. Plant essential oils (EOs) have been recognized as a viable natural source of pest control that reduces the impact to the environment and human health.

The Study

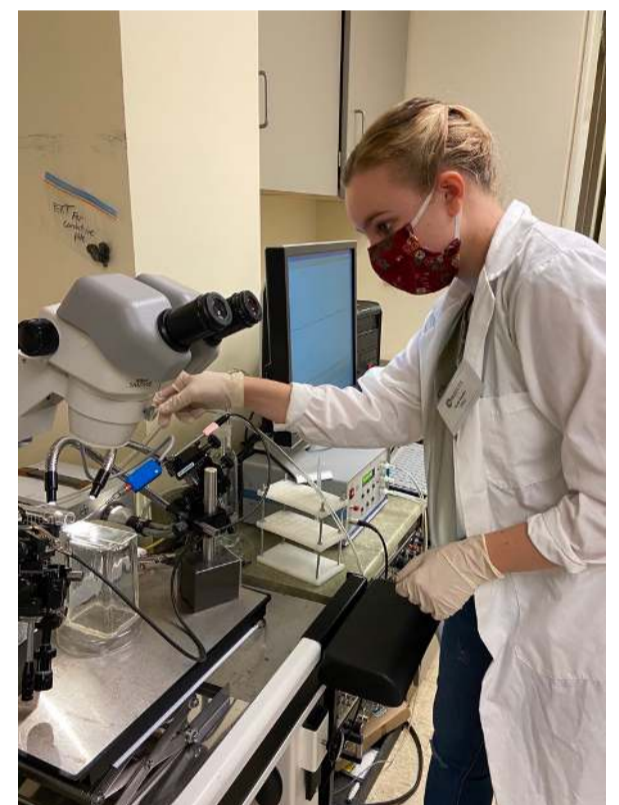
This study is in partnership with the Canadian company Nutrilife Plant Products Ltd. Nutrilife's product 102 is the most effective of their pesticides for control of two-spotted spider mites (TSSM). The main goal of this project will be to investigate the mechanism of action of product 102 in TSSM. In addition, the project will assess the impact of the pesticide to beneficial species, such as bumble bees, and explore the potential of the product as a fungicide.

Methods

Electrotarsogram technology was used to identify potential natural-based products that TSSM are sensitive to. Female mites were dorsally mounted on a fork electrode and a Gas Chromatogram-Flame Ionization Detector (GC-FID) linked to the electrotarsogram (GC-ETD) was used to apply stimuli to the mite. After identifying compounds that elicit a response from TSSM, a two-choice behavioural assay was used to identify compounds as a repellent or an attractant.



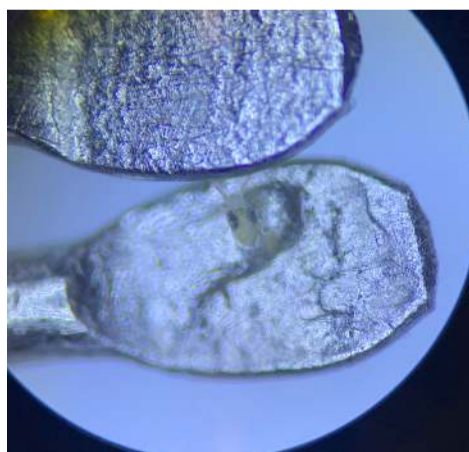
Daily feeding of *Bombus impatiens*.



Testing preparation of *Tetranychus urticae* prior to stimulus injection of GC-FID.



Positive control group of *Cladosporium herbarum* 1-week after inoculation.



Female *Tetranychus urticae* mounted on fork electrode dorsally to be tested on GC-FID.

Product 102 was tested as a potential fungicide using *Cladosporium herbarum* and *Botrytis cinerea*. This experiment was conducted to test for both the prevention and killing of fungus species. Finally, contact toxicity trials were performed using *Bombus impatiens* to test for potential toxicity of product 102.