Phytophthora Zoospore Chemotaxis

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Abstract:

***Phytophthora* oomycetes (greek for 'plant destroyer') cause devastating losses to many food crops and are responsible for the Irish potato famine in the 1800s. Phytophthora can attack plants with single-celled zoospores. These zoospores respond to chemical cues released by plants to decide where to attack. This project evaluates zoospore response to chemical cues to prevent *Phytophthora* infection.**

Summary of Research:

Phytophthora is perhaps the most devastating plant pathogen affecting the human food system and is a major pathogen affecting vegetable production (squash, pumpkin, cucumber, pepper, eggplant, tomato, and snap beans) in NY State. *Phytophthora capsici* is now established in 25 NY counties and has been detected in 100% of irrigation sources in two regions of the state. Management currently relies on intensive fungicide regimes, but left unmanaged, *Phytophthora* losses can reach 100%. *Phytophthora* infection spreads through travel of single-celled swimming zoospores, which use flagella to propel themselves through aqueous media. These zoospores can travel relatively long distances under their own power and respond to chemical cues in their environment. These cues include volatiles released by plants; *Phytophthora* zoospores can be repelled or attracted by these cues and can choose to move toward or away from them. Using a combination of single-cell microfluidic chip bioassays, analytical chemistry techniques, microcosm bioassays, and field experiments we seek to evaluate chemical cues for controlling and preventing *Phytophthora* zoopsore infection.

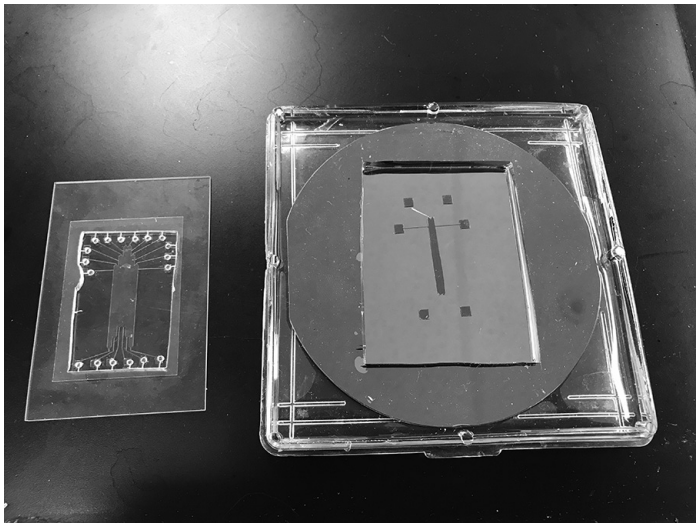

Figure 1: Microfluidic chips made to study Phytophthora *zoospore chemotaxis.*

Previous work has determined zoospore motile ability and suggested specific plant volatiles as potential attractants and repellents. This work will focus on evaluating these cues for applications to New York vegetable crops. These chemical ecology based techniques will provide producers with a potent tool for managing devastating *Phytophthora* infection in the high-value vegetable crops of New York State.