



Trichoderma: A possible solution for Aphanomyces ?

Pratibha Prashar

Postdoctoral Fellow

Department of Plant Sciences
College of Agriculture and Bioresources
University of Saskatchewan



Trichoderma: A possible solution?

- This ascomycete has been established as one of the most acceptable and successful biocontrol agent for a range of soil-borne pathogens.
- Across the globe, more than 50 *Trichoderma*-based products are commercially available as biofungicides, biostimulants, and biological soil amendments (Woo and Lorito,2007).
- *T. harzianum*, *T. viride* and *T. hamatum* are some of the most successful species.
- There are a few reports for successful control of the other root-rot oomycete pathogen, *Pythium*, by *Trichoderma* (Mbarga et al. 2012).
- Dandurand et al. (2000) reported synergistic effect of *T. harzianum* and *Brassica napus* seed meal for complete suppression of *Aphanomyces euteiches* root rot in pea.



Trichoderma in lentil

- Few successful reports for control of soil-borne pathogens particularly *Fusarium oxysporum*

Reference	Strain	Pathogen	Disease	Effects	Place
Garkoti et al. (2014)	<i>T.harzianaum</i> + <i>P.fluorescens</i>	<i>F.oxysporum</i> f. sp. lentis	Wilt	<ul style="list-style-type: none">• Reduced disease incidence• Improved grain yield	India
El-Hassan et al. (2013)	<i>T.hamatum</i> (Isolate from lentil crop, Syria)	<i>F.oxysporum</i> f. sp. lentis	Vascular Wilt	<ul style="list-style-type: none">• Delayed infection time• Higher pathogen mortality• Reduced pathogen colonization	UK
Hannan et al. (2012)	<i>T.harzianaum</i> + <i>Rhizobium leguminosarum</i>	<i>F.oxysporum</i> + <i>Sclerotium rolfsii</i>	Foot Rot	<ul style="list-style-type: none">• Reduced post-emergence plant death• 19/85% higher emergence• Higher plant stand• Up-to 75.56% higher biomass	Bangladesh
Kashem et al. (2011)	<i>T.harzianaum</i> (Native isolate from pulse crop)	<i>F.oxysporum</i> Schlecht	Foot & Root Rot	<ul style="list-style-type: none">• Reduced disease incidence of 6.9% against 39.0% in control fields• Improved seed germination, plant stand and seed yield	Bangladesh



Our Objectives

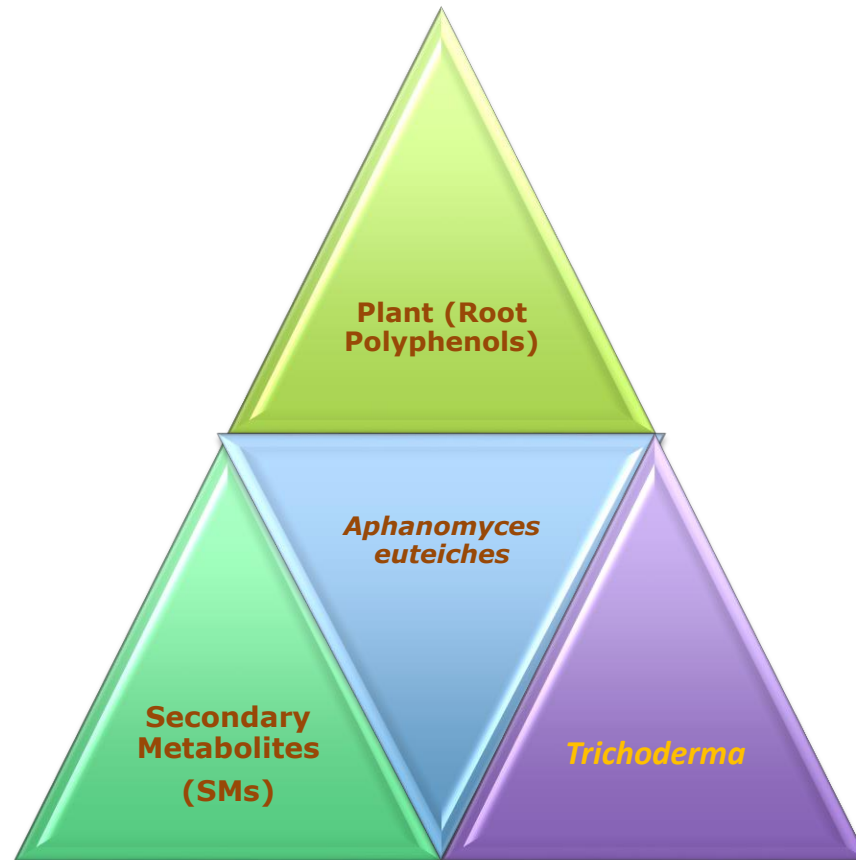
To isolate and screen native as well as other strains of *Trichoderma* and their secondary metabolites (SMs) for antagonistic potential against *Aphanomyces euteiches* in lentil.

To evaluate these antagonistic *Trichoderma* strains and SMs for plant growth promoting (PGP) effects on lentils.

To select best *Trichoderma* strain for providing control to *Aphanomyces* root rot (ARR) and to enhance plant growth characteristics in different lentil cultivars.



The approach



We intend to look into the three-way biological interaction between the pathogen, *Trichoderma*/SMs and the root polyphenols with an aim to develop sustainable strategy for disease control and plant growth promotion.



Preliminary work

A. Lentil screening

- 10 lentil varieties were screened under controlled conditions, for characterizing the response towards pathogen *Aphanomyces euteiches* (Isolate from Saskatchewan, Banniza et al. 2013) .
- It has been found as an aggressive pathogen.
- However, variation has been observed among different genotypes.
- *L. odemensis*, *L. lamottei*, *L. ervoides* (IG 72815) and the zero tannin (white and gray) were found to be more susceptible than *L. orientalis*, *L. ervoides* (L01-827A), *L. tomentosus* and *L. culinaris* (Eston and Maxim).



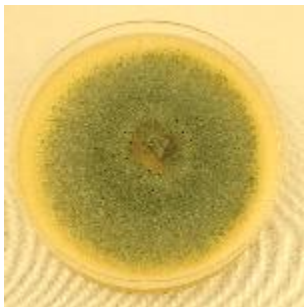
Trichoderma Strains

Native isolates

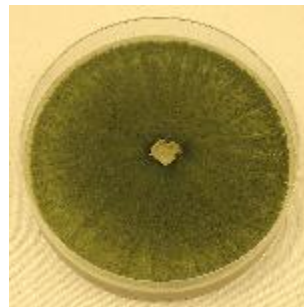
- Isolated 3 antagonistic *Trichoderma* isolates from root and soil samples collected from lentil cultivated soil in Saskatoon region.
- They have shown some antagonistic potential against *Aphanomyces euteiches* in the plate cultures.

Commercially available options

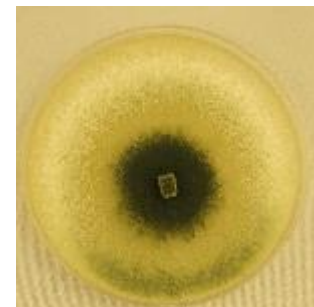
- Different *Trichoderma* strains available with commercial sources will be obtained
- Particularly *Trichoderma harzianum* and *Trichoderma virens*.



S4A5



S5P3



S9A2



Lentil response to *Aphanomyces euteiches* infection



Uninfected



Infected





Root Polyphenols

- My colleague Dr. Navid Bazghaleh is looking into this aspect.
- His poster provided an insight for some initial trend that was observed for the root polyphenols of a few lentil cultivars.
- On the basis of the preliminary observations it may be said that there might be a relation between the root polyphenol profile and the disease response.
- So, it might be interesting to look if *Trichoderma*/SMs influences the root polyphenol profile and thus the interaction of plant (root) with *Aphanomyces euteiches*.