

**2017 Acorn Conference & Trade Show  
Best Western Glengarry - Truro, NS**

**Title:** Combating Fusarium Basal Rot of Onion and Allium Species in Nova Scotia

**Presenter:** Adele Burberry- Blanchette

**Summary:** This workshop focused on trials isolating Trichoderma species from local soils, and determining their value as biological control agents against Fusarium oxysporum using field tests, dual culture lab tests, and greenhouse bioassays. The research was conducted as part of Adele's graduate work at Acadia University.

Fusarium Oxysporum (FOC) is a common form of fusarium fungi found in abundance in soils in the Annapolis Valley. FOC is comprised of many strains. Forma Specialis denotes a pathogenic strain, which in the case of this research affects Allium species. Fusarium Oxysporum often infects onion bulbs and other alliums causing them to rot in the field or soon after harvest.

FOC life history:

- Always present in the soil; normally dormant and can remain dormant in the soil indefinitely.
- Optimal germination/growth temperature is 25-32C.
- Spreads primarily by movement of infected soil or plants.
- Virulence differs between strains.

FOC in the Annapolis Valley:

- We don't know a lot about FOC in Nova Scotia.
- Affected plants begin to rot on the bottom usually.

Traditional Control Measures:

- Long crop rotations (4-7 years) are usually recommended if basal rot is present in crops. Because of Fusarium Oxysporum's ability to stay dormant for long periods, this strategy hasn't worked that well.
- Fungicides haven't worked well either to suppress FOC.

Adele and her collaborators at Acadia decided to experiment with a biocontrol approach to deal with fusarium Oxysporum. This essentially meant the use of one living organism to control the population of an unwanted organism, in this case FOC.

Benefits of using a Fungal biocontrol agent:

- A biocontrol agent is often self propagating, providing long-term suppression of the unwanted organism.
- Provides resistance in multiple ways.
- Beneficial to the host.

- Low toxicity; can comply to organic farming standards.
- Minimal ecological impact.

The research began by trying to isolate a locally adapted biocontrol agent to control FOC. The process consisted of the following steps:

1. Sample soil in local onion fields, then collect the organisms present.
2. Grow the organisms in the lab, **isolate and identify** these.
3. These local agents were tested to determine their effects on fusarium Oxysporum.

Various strains were identified using DNA analysis.

The results:

- 44 species of fungi identified.
- Of these, 7 trichoderma species were found. Trichoderma strains have been developed as biocontrol agents in agriculture against fungal diseases.
- Field Trials were carried out to determine if existing products containing trichoderma fungi would be effective against FOC. Three products approved for organic crops were used during the summer of 2016 and 2017.

2016 field trial results:

- Any single treatment had worse symptoms among the affected alliums than the control which received no treatment.
- Treatments with a double dose of Trianum (a variety of Trichoderma) had the least severe symptoms of fusarium infection.

2017 field trial results:

- Inconclusive, pending re-evaluation.
- Field FOC symptoms were low throughout the study area in 2017.

Trials were also conducted in the laboratory.

- Trianum seems to have overgrown the fusarium.
- Positive linear growth of FOC without treatment.
- Growth of fusarium stops in dual culture introduction of Trichoderma. In particular, locally sourced harzianum(a form of Trichoderma) definitely has some effect on fusarium.
- The commercially available products including Rootshield, Preston, Trianum did not show great results.

Summary:

- This initial research has isolated trichoderma from Nova Scotia soils and points to its potential to reduce FOC. This is especially true for the harzianum strain.
- More research is needed.

Q. Do you have a sense of how mobile FOC is in the field?

A. You have to physically move the soil to spread fusarium.

Q. Any soil types or fields worse than others?

A. Yes, this is the case, some fields are more heavily infected than others.

Q. Could a combination of strains be more effective?

A. Perhaps.

Q. Is the FOC living in all levels of the soil?

A. Less frequent as you go lower and cooler?

Q. Which strain of the worked the best?

A. Definitely the harzianum strain.