

Canadian Agri-Science Cluster for Horticulture 3



Update to Industry

2020-21 – Semi-Annual

Activity title:

Activity 12 - Common Scab: Increasing profitability of Canadian potato producers by controlling common scab

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Activity Objectives (as per the approved work plan):

Common scab results in significant economic losses every year in Canada. Common scab symptoms are characterized by brownish lesions on potato tubers that can result in declassification of tubers in seed production, rejection for the table market and difficulty in peeling the tubers leading to significant losses in the processing industry. There is currently no chemical registered specifically to control common scab in Canada.

The overall objective of the project is to evaluate several methods to control common scab of potato under a range of environmental conditions and soil types across Canada.

The specific objectives of this project are to:

- Sub-activity 1.1 Characterize the genetic diversity of *Streptomyces* spp. causing common scab and develop tools to measure specific genotype,
- Sub-activity 1.2. Evaluate methods to control common scab using small plot and field-scale trials in commercial potato fields,
- Sub-activity 1.3. Determine the effect of common scab control methods on soil health and quality parameters,
- Sub-Activity 1.4. Determine the concentrations of soil isothiocyanates produced through the degradation of a mustard meal and mustard residues
- Sub-Activity 1.5. Evaluate the effect of common scab control methods on microbial communities.

Research Progress to Date:

Sub-activity 1.1 The common scab pathogens (349 isolates) were isolated from tubers of forty-nine infested fields in NB, PEI, and MB to evaluate their genetic diversity. The isolate pathogenicity was tested by targeting a gene essential for infection (*txtA*) and their genetic background assessed using rep-PCR. Preliminary results showed that the pathogens could be classified into 14 different genetic groups. Sequencing of the entire genomes of a representative isolate of each genetic group is currently under-going.

Sub-activity 1.2.1 Field studies in PEI (Cavendish Farms). A study was performed to evaluate the efficacy of peroxide-based products in controlling common scab severity in a field trial. The products were used as a drench in the furrow at planting and on the hill at the tuber set. The trial was planted in June and harvested in October, and assessment of the

common scab incidence and severity are currently being performed to determine if there is a significant decrease of the disease by these products.

Field studies in MB (Peak of the Market). A nine treatment replicated small plot field trial was established in Winkler. The treatments evaluated in 2020 included 1) Serenade Soil in-furrow, 2) barley as a nurse crop, 3) barley nurse crop plus Serenade Soil in-furrow, 4) composted beef manure, 5) composted beef manure plus Serenade Soil in-furrow, 6) liquid mustard (2.5 gallons/ acre, 7) liquid mustard (5 gallons/ acre), 8) 2,4-D Ester and 9) control (untreated). The nurse crop failed to establish, which was the same result experienced with nurse crops in the 2019 trial. Measurable disease pressure was observed due to the dry conditions that were conducive to common scab. Tubers were harvested and stored until visual assessment for common scab can be completed.

Sub-activity 1.2.2. Field studies in PEI (AAFC)

The first study evaluated the effect of the rotation crop system on common scab severity in commercial potato fields. In summer 2020, four field sites in central PEI with different previous rotational crop splits were used as follow: 1) double mustard vs sorghum/sudan + pearl millet + tillage radish, 2) pearl millet vs sorghum/sudan, 3) black peas (no mushroom compost) vs (W) wheat (mushroom compost), 4) single mustard vs sorghum/sudan + pearl millet. The second study evaluated the effect of fertilizer-based products on the severity of common scab was evaluated for a second year. The treatments included 1) Tropico (CaNO₃), 2) ammonium sulfate and 3) elemental sulfur applied in-furrow to small plots in Harrington, PEI. For both studies, the soil was sampled at tuber initiation and harvest. Tubers were harvested and disease severity evaluation is in progress.

Sub-activity 1.3. The abundance of the common scab pathogen in soils from the trial done in PEI was collected and will be processed later this fiscal year.

Sub-Activity 1.4. The method to quantify isothiocyanates, volatile compounds produced through the degradation of a mustard meal and mustard residues in soils was developed. Because of COVID19, this activity was postponed to the next fiscal year.

Sub-Activity 1.5. This activity will be performed once successful field trials are identified.

Extension Activities (presentations to growers, articles, poster presentations, etc.):

Shinners-Carnelley, Tracy. 2020. Presented field trials and preliminary results to control common scab to growers. Peak of the Market Field Day, Winkler, August 13th.

Yorinori, Newton. 2020. Presented field trials and preliminary results to control common scab to growers. Cavendish Field Day, Annan, PEI. September 25th.

COVID-19 Related Challenges:

COVID-19 has complicated the field season but the trials went ahead without changes. The closure of labs at university and AAFC laboratories have resulted in delays in most activities however, these activities have now resumed that the laboratories have re-opened. The exception is the quantification of isothiocyanates from mustard and mustard meal that will be postponed to the next fiscal year.

Key Message(s):

This project will identify possible methods to control common scab to reduce economic losses to the growers. This project will allow a better understanding of the diversity of the common scab pathogen in NB, PEI and MB to improve the detection of specific species or strains of the common scab pathogen.

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