

# Canadian Agri-Science Cluster for Horticulture 3



## Update to Industry

### Semi-Annual – Spring 2021

<p><b>Activity title:</b> Late blight: Tracking pathogen strains and their characteristics</p>
<p><b>Name of Lead Researcher:</b> Rick Peters, Agriculture and Agri-Food Canada (AAFC), Charlottetown, PE</p>
<p><b>Names of Collaborators and Institutions:</b> Khalil Al-Mughrabi (New Brunswick Department of Agriculture, Aquaculture and Fisheries), Vikram Bisht (Manitoba Agriculture), Fouad Daayf (University of Manitoba), Rishi Burlakoti (AAFC, Agassiz, BC)</p>
<p><b>Activity Objectives (as per approved workplan):</b></p> <p>The overall objectives of the project are to track the distribution of strains of the late blight pathogen in Canada, determine various important biological characteristics of isolated strains including fungicide sensitivity, with the overall aim of improving disease management and economic returns.</p> <p>The specific objectives of this project are:</p> <p><b>Sub-activity 1.1 Tracking potato strains of <i>P. infestans</i> in Canada</b>              To identify strains of <i>Phytophthora infestans</i> causing late blight of potato in production areas across Canada and to develop a map showing the distribution of strains in this country.</p> <p><b>Sub-activity 1.2 Characterization of novel strains including host/cultivar preference, environmental triggers, fungicide sensitivities, and control options</b>              To assess novel late blight pathogen strains in Canada for their ability to cause disease in above and below-ground tissues of solanaceous plants, and to determine their sensitivity to registered and novel fungicides as well as the optimal environments for infection, spore production and survival (with the aim of understanding the impact of climate change on late blight pathogen population dynamics).</p>
<p><b>Research Progress to Date (use plain language, not to exceed 500 words):</b></p> <p><b>Sub-activity 1.1 Tracking potato strains of <i>P. infestans</i> in Canada</b>              Late blight was not a significant concern in much of Canada in 2020. This was likely due to the warm, dry growing conditions in most of the country. Some spores of the pathogen were captured in spore traps set up in Manitoba and Ontario, but no disease foci were observed, so samples could not be assessed. Some late season disease was observed in a potato field in Ontario, but the field was quickly top-killed and no samples could be obtained. Late blight was observed in both potatoes and tomatoes in British Columbia, and a total of 90 isolates were obtained for further processing. Late blight symptoms were observed in several commercial potato farms (10) in Delta, Richmond, Surrey, and Abbotsford. Late blight occurred very early, between the last week of July to early August in commercial potato farms in BC. Late blight incidence was low to moderate. Samples from several potato cultivars, including AC Peregrine Red, GemStar Russet, Russet Norkotah, Kennebec, and Warba were collected. Late blight symptoms were also observed in tomatoes grown in several community and home gardens in the Fraser Valley regions including Chilliwack, Abbotsford, and Pitt Meadow in August and September. Late blight severity in these home and community gardens was very high (many plots were wiped out). Diseased samples were collected from both cherry-type and big (Roma) tomatoes. All the isolates from potato (n = 40) and tomato (n = 50) were also sent to AAFC Charlottetown for long-term storage and further characterization work. At AAFC Agassiz, all isolates are being cultured to harvest mycelium for genomic DNA extraction, which will be used for the molecular characterization of strain (identify the strain type).</p>

## **Sub-activity 1.2 Characterization of novel strains including host/cultivar preference, environmental triggers, fungicide sensitivities, and control options**

Fungicides to be used in efficacy trials were acquired from pesticide companies in Canada and growth chamber trials to test the efficacy of various fungicides against late blight are underway and currently being conducted at Dalhousie University by graduate student Segun Babarinde. Studies to determine the sensitivity of pathogen isolates to fungicides were continued in PEI. Studies on the resistance to Ridomil® in the 2019 and 2020 collection of pathogen isolates was completed. The isolates from BC which comprised the majority of the collection in these 2 years were largely resistant to Ridomil®. A baseline dataset on the response of isolates to Orondis® was also completed. So far, no resistance to this chemistry has been found. Studies using a thermal gradient cell system that allows very precise temperature control is continuing to be employed to assess the impact of temperature on the biology and reproduction of various pathogen strains. The growth of several new strains was greater at 20 °C and 25 °C than at other temperatures, which is warmer than would be ideal for older strains. This may be one reason that newer strains are becoming more common.

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

### **Presentations and Webinars**

January 28-29, 2021. Pacific Agriculture Show.

Horticultural Growers' Short Course, Lower Mainland Horticulture Improvement Association

Invited Virtual Presentation: Late Blight: Always an Issue for Potatoes – Implications for Home Gardeners.

Burlakoti, R.R. and R.D. Peters

February 18-19, 2021. The Professional Pest Management Association of British Columbia 2021 Symposium. Study on pathogen population dynamics: Insight into biology and management of crop diseases.

Burlakoti, R.R.

March 9, 2021. Spud Smart Innovation Series Webinar & Podcast.

Webinar: Fighting back against late blight.

<https://spudsmart.com/fighting-back-against-late-blight-a-spudsmart-innovation-series-webinar-podcast/>

Peters, R.D.

March 23-24, 2021. Northeast Potato Technology Forum.

Assessment of populations of *Phytophthora infestans* in Canada in 2019 – changing tides.

MacPhail, R.A. and R.D. Peters

March 30, 2021. KPPA Manitoba Spring Production Meeting. Update on the disease and insect pests in 2020 in Manitoba. 2021.

*ONLINE Grower Meeting: Updates on late blight field surveillance, forecasting and spore trapping also discussed.*

Bisht, V.

### **Conference Proceedings**

Burlakoti, R. R., and Peters. R.D. 2021. Late Blight: Always an Issue for Potatoes – Implications for Home Gardeners. In: Kabaluk, T. and Frey, L (Eds.) Proceedings of the Lower Mainland Horticulture Improvement Association 62nd Annual Horticulture Growers' Short Course. Abbotsford, BC, January 28-29, 2021. In press.

MacPhail, R.A., Burlakoti, R., Al-Mughrabi, K.I., Daayf, F., Bisht, V., Novinscak, A., Pawanpuneet, R., MacDonald, K., Gregory, D., Crane, B. and Peters, R.D. 2021. Assessment of populations of *Phytophthora infestans* in Canada in 2019 – changing tides. Page 20 in "Proceedings of the Northeast Potato Technology Forum - 2021." Published by McCain Foods Ltd.

<https://northeastpotato.com/wp-content/uploads/2021/03/2021-NEPTF-Abstract-Booklet.pdf>

### **Interviews Related to the Late Blight Program**

August 14, 2020: Shel Zolkewich for SpudSmart

October 19, 2020: Ashley Robinson, Associate Editor for SpudSmart

### **News Releases**

Irish potato famine disease still lurks in Canada. Shel Zolkewich for SpudSmart, Issues Ink. November 16, 2020.

<https://spudsmart.com/irish-potato-famine-disease-still-lurks-in-canada/>

A flu shot for potatoes. Ashley Robinson for SpudSmart, Issues Ink. November 23, 2020.

<https://spudsmart.com/a-flu-shot-for-potatoes/>

Agassiz researcher asking home gardeners to help battle potato blight. G. Kennedy for Agassiz Harrison Observer. February 18, 2021.

<https://www.agassizharrisonobserver.com/news/agassiz-researcher-asking-home-gardeners-help-battle-potato-blight/>

### Provincial Outreach

Weekly reports on potato diseases and insects were sent to growers and others in the potato industry and information placed on-line (for example, in Manitoba reports were recorded on [www.mbpotatoes.ca](http://www.mbpotatoes.ca); New Brunswick's reports were recorded on the NB Potato Crop, Weather and Pest Information website <https://agri.gnb.ca/010-001/Index.aspx?lang=en>).

Brochures on "late blight of potato and tomato in the home garden" were distributed to home garden centers in NB to provide to their staff and customers in order to familiarize them with the late blight disease and how to manage it.

[www2.gnb.ca/content/dam/gnb/Departments/10/pdf/Agriculture/Brochure\\_LateBlightPotatoTomato\\_inHome%20Garden](http://www2.gnb.ca/content/dam/gnb/Departments/10/pdf/Agriculture/Brochure_LateBlightPotatoTomato_inHome%20Garden)

Although challenges due to Covid-19 often prevented in-person meetings, potato pest updates were discussed in various forums with growers and potato agronomists. These included phone calls, virtual meetings, radio interviews and email/website transmission of information.

### COVID-19 Related Challenges:

As expected, the Covid-19 pandemic affected all of our lives this past year. Project activities were stalled.

Impact: Fortunately for this project, industry and academic collaborators continued to collect and provide disease samples that were stored for future examination and extraction of pathogen isolates, thereby minimizing the impact in project goals. In addition, disease levels were low in the field in 2020, except for late season disease in BC. As well, most characterization studies take place during the winter and we were able to re-enter facilities in autumn to continue this work. As a result, the impact on project goals was minimal, and we have been able to accomplish our targeted goals. No funds were requested to be moved to future years of the study and the project remains on track.

Action Plan: Critical isolates of *P. infestans* from 2019 and 2020 were maintained as part of critical duties at AAFC Charlottetown and AAFC Agassiz during the Covid-19 pandemic. This has allowed renewed efforts at strain analysis to continue on these collections as we have re-entered the labs this fall. Assessment of 2019 isolates for mating type, fungicide sensitivity, and allozyme and strain genotype is almost complete, and analysis of 2020 isolates is also almost complete. Preliminary results of these analyses showed a high level of diversity in isolates from BC, and the potential for the presence of a number of strains, which has significant potential repercussions for disease epidemiology and management. As well, DNA extraction of 2019 and 2020 isolates has been accomplished. Further molecular analysis is being planned for this spring as we also forge ahead into another field season.

### Key Message(s):

Even though late blight was not prevalent in Canada in 2020, it can reappear at any time, and an understanding of the prevalence and characteristics of pathogen strains will be critical for successful disease management. The multiple strains that seem to be present on both potatoes and tomatoes in BC is of concern and we are watching this situation closely. Having multiple strains in a growing area could lead to the generation of even more new strains and the potential for overwintering structures which would start disease earlier in the season. Many strains are resistant to Ridomil, but fortunately, other late blight control chemistries remain effective and valuable tools for disease control. It seems that some of the newer strains have adapted to be more successful at warmer temperatures which may be one reason they are becoming more common. This finding is preliminary and we are continuing to do work in this area. During the Covid-19 pandemic, there is increased interest among the public to grow food plants, including tomatoes and potatoes in home gardens. We are increasing our efforts to educate home gardeners to grow late blight-resistant tomato varieties and to destroy infected potato and tomato plants properly, so they are not a risk factor in spreading disease to surrounding commercial crop production areas.

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The voice of Canadian fruit and vegetable growers