Canadian Agri-Science Cluster for Horticulture 3

Update to Industry

Semi-Annual – Fall 2021

Activity title:
Investigating the occurrence and distribution of potato tuber necrosis-inducing viruses in Canada and studies on varietal responses to the viruses for minimizing economic losses caused by the pathogens

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Activity Objectives (as per approved workplan):
FY 2021-2022

- Unveiling the incidences/occurrences of necrotic viruses (mainly PMTV and PVYNTN) in potatoes in the participating provinces (mainly Manitoba and New Brunswick) in 2021;
- Understanding the sensitivity of up to 6 potato cultivars to Alfalfa mosaic virus-induced internal necrosis and the sensitivity of up to 5 newly released potato clones/cultivars to PVYNTN-induced potato tuber necrotic diseases;
- Unveiling the sensitivity to PMTV-induced necrosis in (a) 12 potato cultivars – second year trail of group one cultivars; and (b) up to 13 potato cultivars – first year trail of group two cultivars.

Research Progress to Date (use plain language, not to exceed 500 words):

Objective 1: We completed the laboratory testing of a total of 523 tuber samples (480 random and 43 symptomatic) from the year 2000's crop from the participating provinces for the target viruses, namely potato mop-top virus (PMTV), tobacco rattle virus (TRV), alfalfa mosaic virus (AMV) and potato virus Y strain NTN (PVYntn). Of the 480 random tubers, 53 (11%), 1 (0.2%), 0 (0%) and 2 (0.4%) tested positive for PMTV, PVY, AMV and TRV, respectively. Of the symptomatic tubers, all but one (i.e., 42/43 or 97%) tested positive for PMTV, and none tested positive for other necrotic viruses, demonstrate that PMTV is the major tuber-necrotic virus in Manitoba the participating provinces in

comparison to other necrotic viruses. Tuber samples from 2021's crops from the participating provinces (i.e., MB and NB) are yet to be received.

Objective 2: Previously, we reported the repeat one of the sensitivity of 9 cultivars (Shepody, Dark Red Norland, Goldrush, Atlantic, Kenebec, Snowden, Lamoka, Russet Burbank and Russet Norkotah) to **AMV-induced internal necrosis** under secondary infection (i.e., tuber-borne) and the sensitivity of 11 advanced clones (F14002, F14021, VF14016, VF14017, VF14018, CV011010-2, F15062, 1-4, 12-4, 9-7, 12-7) along with the control cv Yukon Gold to **PVYntn-induced necrotic ringspot disease (PTNRD)**. In this simi-annual period (Apr – Oct 2021), the repeat two of the sensitivity of the above mentioned cultivars to their respective virus-caused tuber necrosis under secondary infection are ongoing.

Objective 3: A total 22 cultivars (**9** for the second-year trial: Atlantic, Chieftain, Dark Red Norland, Goldrush, Kennebec, Russet Burbank, Shepody, Snowden, Yukon Gold; and **12** were for the first-year trial: AAC Canada Gold, AAC Valley Crisp, Caribou Russet, Hodag, Innovator, Ivory Russet, Manistee, Maritime Russet, Monica Russet, Mountain Gem Russet, Non Pareil Russet, and Reveille Russet) were selected based on their popularity and availability of high class (nuclear) seeds for the field trial 2021 in a PMTV-infested field in New Brunswick. A randomized complete block design with four replications, each consisting of 15 seed tubers planted 0.3 m apart with potato spacers. The tubers were planted in the mid-later May 2021, and the test plot was managed similarly as those in the adjacent fields. Potatoes were harvested in later September 2021, and the tubers from each treatment have been divided into 4 groups evenly for different storage periods (0, 3, 6 and 9 months postharvest) at 4-7^{o}C at the NB Agriculture's Potato Development Centre in Wiklow. The tubers at harvest (stored for 0 month) are currently being analyzed at the AAFC's Fredericton Research and Development Centre for symptom expression and infection testing with molecular (reverse transcription-PCR, AAFC-Fredericton) and ELISA (Agricultural Certification Services) methods .

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

One (1) poster presentation in a scientific conference: Nie X , Singh M, Lavoie J, Bisht V, Shukla M, Creelman A and Lai M. 2021. Potato mop-top virus, an emerging challenge to potato industry. Tri-Society (Canadian Phytopathological Society-Canadian Society of Agronomy-Canadian Society for Horticultural Science) Virtual Conference 2021. July 5 – 9, 2021. Poster presentation (no. 153).

COVID-19 Related Challenges:

1. Some lab/greenhouse based activities have been delayed due to COVID-19 caused space restrictions.

Key Message(s):

All progresses well.

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