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Potato Psyllid

Potato psyllid (*Bactericera cockerelli*) is a small, winged insect that has been around for several years. It is one of approximately 100 species of psyllids in North America. It reproduces mostly on the potato and other members of the nightshade family (Solanaceae) including tomatoes and peppers.

Background

Potato psyllid can cause psyllid yellows in potatoes, resulting in chlorosis, stunted plants and small misshapen tubers.

Potato psyllid can transmit a bacterium-like pathogen known as *Candidatus Liberbacter solanacearum*, which causes zebra chip disease. The disease can cause significant yield reductions and creates serious quality issues, forming dark stripes in the tubers when they are cut and fried.

Although the defect is harmless to consumers, potato chip processors reject infected potatoes due to the unacceptable dark stripes and the off-taste of the fried chips. Not all potato psyllids are carriers of the zebra chip pathogen, and so far, the disease has not been detected in Canada.

The zebra chip disease was first detected in Texas in the United States in 2000 and has been spreading northward. In 2011, the disease was found in damaging levels in the Pacific Northwest, a major potato producing area.

Potato psyllids are able to survive temperatures well below freezing, but they do not overwinter in Canada. They could be carried by winds to Canada from the United States during the summer. Identification, scouting and monitoring programs can help producers be prepared should the zebra chip disease spread to Canada.

Life cycle

Potato psyllids develop through three life stages: egg, nymph and adult. Under optimal conditions, the potato psyllid can complete a generation in less than a month. The insect can have a minimum of two and possibly three complete generations in a season.

Adults

The adult potato psyllid is a tiny black insect about 2 mm long resembling winged aphids and small cicadas. They have clear wings that rest roof-like over the body, white stripes on the head and thorax, and bold, white bands on the abdomen. Adults can fly and jump very quickly when disturbed. Psyllids are dispersed by wind, and movement is greater when temperatures are near or above 33 C.

Eggs

Each female psyllid can lay about 200 eggs, which are football-shaped and yellow to orange. The eggs are attached individually on short stalks, usually on the upper canopy on the underside and along the edges of leaves. Eggs can hatch in 6 to 10 days, depending on the temperatures, hatching earlier at warmer temperatures. However, temperatures above 32 C are severely harmful to eggs. The eggs are very tiny, and a 10X magnifying hand lens is required to see them.

Nymphs

Psyllid nymphs are pale green and flat and have a fringe of short spines around their body. The nymphs go through 5 stages in about 19 to 24 days. They look like immature soft scale insects or whiteflies, but move readily when disturbed. When field scouting, producers need to be aware that psyllid nymphs should not be confused with potato leafhopper nymphs. The psyllid nymphs secrete a

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white substance resembling salt that collects on leaves beneath the feeding insects.

Host plants and crop damage

The potato psyllid feeds on a wide range of plants, but reproduces mostly on the potato and other plants in the nightshade family, such as tomatoes peppers and related weeds. The potato psyllids can damage potato plants even if they do not carry the zebra chip pathogen. All potato cultivars appear to be susceptible to zebra chip.

Psyllid yellows

Potato psyllid nymphs attach to the underside of leaves and feed by sucking plant juices through needle-like mouth parts. The nymphs inject a toxin into plants as they feed, which results in chlorosis and stunting, a physiological condition known as psyllid yellows.

Symptoms can appear as quickly as within one week, but more commonly appear after two or three weeks. In young plants, the entire plant can be stunted, showing shriveled, yellow or purplish curled leaves, especially in the upper portion of the plant. Plants may have a rosetted canopy, and small green tubers may appear aboveground. Tuber growth slows or stops, resulting in small, misshapen tubers and yield loss.

Although environmental conditions can strongly influence symptom expression, if symptoms are caught early and psyllids controlled, plants can recover from psyllid yellows.

Zebra chip disease

Adult or nymph psyllids acquire the *Candidatus Liberbacter solanacearum* pathogen when feeding on an infected plant, and once infected, the insects are always a pathogen carrier. Eggs laid by infected adults and resultant nymphs are also infected.

The pathogen affects the phloem tissue in potatoes, causing foliar and tuber symptoms, and takes about three weeks from infection to symptom appearance. The pathogen can also cause higher than normal sugar concentrations in the tubers.

Foliage symptoms are similar to psyllid yellows, including stunting, chlorosis, leaf scorching, swollen nodes, vascular tissue browning and curled leaves turning yellow or purple. The potato stems can have a zigzag pattern, shortened internodes, swollen nodes, auxiliary bud and aerial tubers and early death.

Symptoms in tubers include vascular tissue browning and the development of dark striped patterns of necrosis.

Infected seed tubers usually do not sprout; if they do, they

produce hair sprouts or weak plants. Therefore, seed potatoes are probably not responsible for spreading zebra chip.

Processed tuber defects include higher than normal sugar levels that cause caramelization when fried, resulting in dark brown stripes that resemble a zebra stripes pattern.

Monitoring

Monitoring for potato psyllid and zebra chip as part of regular scouting, along with watching potato psyllid patterns in other areas to help assess risk, is important. Producers need to learn how to properly identify the potato psyllid at the egg, nymph and adult stages.

If necessary, work with potato specialists to assess the risks and have testing done for the zebra chip pathogen *Candidatus Liberbacter solanacearum*.

Yellow sticky cards can be used to monitor adults only. Place the cards inside the field at about the height of the canopy toward the field edge. Check and replace sticky cards at least once a week or more often.

Handle and transport the cards carefully to ensure proper identification of the insects. Either place the individual cards in a thin, clear plastic bag separated with a wooden rack and covered with wax paper or covered with the paper covering that comes with the card. If using a plastic bag, carefully adhere the sticky face of the card to the inside face of the bag. Label each card with the name, date and GPS location or field location .

Sweep nets can also be used to monitor adults only. Take 100 sweeps from around the field perimeter. Collect all insects from the sweep net into a plastic bag, jar or vial and freeze overnight. Freezing the sample immediately decreases the potential for sample degradation.

Once samples of adults have been collected, either with sticky cards or by sweep net, and frozen, producers should send an e-mail to bugs.r.us@gov.ab.ca for direction on where to ship the samples. These samples will help determine if potato psyllid is becoming a problem pest and/or if it is carrying zebra chip disease into Alberta.

Leaf sampling can be used to monitor adults, eggs and nymphs. Collect 10 leaves from 10 locations within 30 feet of the edge of the field. Fully expanded leaves are collected from the middle section of the plant. A hand lens is needed to see psyllid nymphs and eggs.

Economic thresholds

Currently, no economic threshold has been established for

psyllids on potatoes. Report any observations of potato psyllids to provincial entomologists and specialists.

Control

Monitoring is the most important strategy for Alberta growers to be prepared if the potato psyllid becomes a concern. Scout fields for psyllids by sweeping foliage to look for adults, and examine the underside of leaves for nymphs in the middle to upper third of the canopy.

Many of the products registered in Canada for management of other potato pests will also control the potato psyllid. Because this insect lives on the underside of leaves, applicators should be aware of any special pesticide needs for coverage and canopy penetration. Always use registered products and follow label directions. No products are registered for potato psyllid control in potatoes in Alberta.

Best management practices

- Scout fields regularly.
- Look for chlorosis, leaf scorching, swollen nodes, vascular tissue browning and curled leaves.
- Remove all volunteer plants.
- Use sticky cards and sweep nets to monitor for adults.
- Use leaf sampling for eggs, nymphs and adults.

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