NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

Know how. Know now.

G2113

The Potato/Tomato Psyllid

Jeffrey Bradshaw, Extension Entomologist
Alexander D. Pavlista, Extension Potato Specialist
Robert Harveson, Extension Plant Pathologist

Outbreaks of potato/tomato psyllid are sporadic but occur suddenly over vast areas of North America, including Nebraska. They are small insects that cause damage by infecting plants during feeding. Monitor their appearance and protect potato, tomato, pepper, and eggplant using chemical control.

There are approximately 1,000 species of psyllids (or jumping plant lice) in North America. Most feed on woody plants such as trees and shrubs. However, one occasionally pestiferous psyllid for herbaceous crops is *Bactericera cockerelli*, the potato/tomato psyllid.

Potato/tomato psyllids overwinter in Mexico, the lower Rio Grande River Valley of the U.S., and other locations in the southwestern U.S., and move northward in the spring. The adults can appear in Nebraska as early as late May, depending on southern temperatures and wind patterns. Potato/tomato psyllids have a large host range and feed on many plants in the family Solanaceae, especially potato, tomato, pepper, and eggplant. While feeding on sap, the adults may transmit a pathogen known as 'Candidatus *Liberbacter solanacearum*' (the causative agent of zebra chip disease). The nymphs, while feeding, inject a toxin into plants that results in chlorosis and stunting, a condition known as psyllid yellows.

What Do Psyllids Do to a Plant?

Psyllid Yellows

When psyllid nymphs attach to the underside of leaves, they feed by sucking plant juices. In the process, some of their saliva enters the veins of the plant, much like mosquitoes on animals. That saliva contains a natural toxin that causes widespread growth reduction of different plant parts.

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, curled leaves especially in the upper portion of the plant. Plants may have a rosetted canopy, i.e., similar in appearance to a head of romaine lettuce (*Figures 1* and *2*). Young leaves also may have purplish veins and margins.

This psyllid-induced disease can affect potatoes, tomatoes and, rarely, peppers and eggplant. In potato, small green tubers may appear aboveground (known as aerial tubers). In tomato, pepper, and eggplant, the toxin causes either no fruit production or an overproduction of very small fruit. Interestingly, in some

Figure 1. A plant showing symptoms of psyllid yellow.

Figure 2. Plants with psyllid yellow have a rosetted canopy.

pepper varieties, potato psyllids can cause a slight increase in yield. In potato, tuber growth slows or stops, resulting in small tubers and yield loss. Tubers also tend to be misshapen (*Figure 3*). Although symptom expression can be strongly influenced by environment, if symptoms are caught early and psyllids controlled, plants can recover from psyllid yellows.

Figure 3. Misshapen tubers result from psyllid yellows.

Zebra Chip

This psyllid transmitted disease was discovered in the U.S. in 2000. This pathogen causes a dark starburst pattern when potato chips are fried (*Figure 4*). Importantly, the adult psyllids transmit the bacterium and not the nymphs. To learn more about zebra chip disease, read NebGuide G2112, *Zebra Chip Disease of Potatoes in Nebraska.*

Figure 4. Zebra chip pathogen causes discoloration.

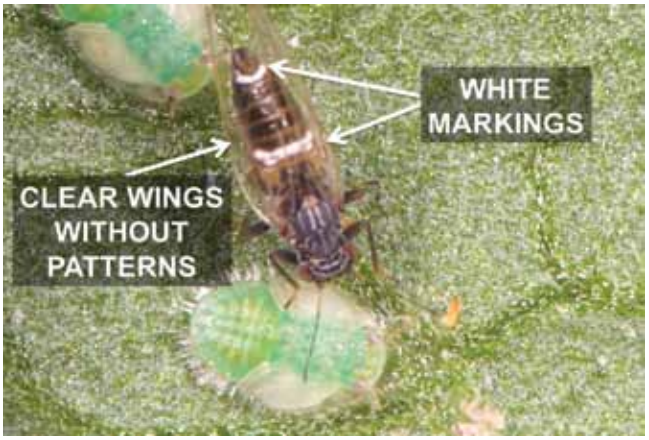

Figure 5. Adult psyllid.

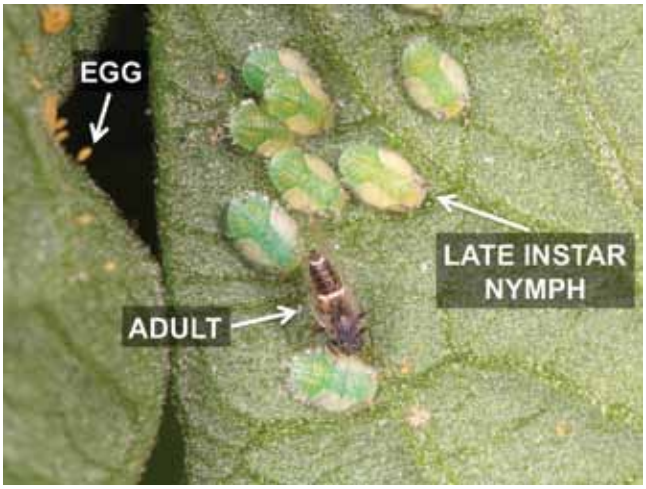

Figure 6. Psyllid nymphs on a leaf.

Figure 7. Psyllid nymph (left) can look similar to a potato leafhopper nymph (right).

What Do Potato/Tomato Psyllids Look Like?

Adult psyllids arrive in Nebraska in early summer. They are about one-tenth of an inch long with wings held roof-like over the body (*Figure 5*). Adults are black with white markings and have clear wings (unlike many other psyllids). They

appear like minute cicadas. As they migrate northward, the adults lay orange, football-shaped eggs that are about the size of a pinhead. Eggs hatch, producing nymphs within a few days. Nymphs have a scale-like appearance ringed with tiny hairs that can only be seen under magnification. On the leaf, nymphs look like pale white-orange or green dots (*Figure 6*) and should not be confused with potato leafhopper nymphs (*Figure 7*). Once feeding begins on the underside of leaves in the upper canopy, the nymphs remain stationary until they molt and begin moving to other feeding sites. On potatoes, potato psyllids generally require four to five weeks to complete their life cycle. However, their development time can be altered by factors such as potato variety and temperature.

Can Environment Limit Psyllids?

Temperatures above 90°F are severely harmful to eggs. The optimal developmental temperature for nymphs is around 80°F. Adult dispersal is facilitated by windy conditions and temperatures remaining at or above 92°F. Dispersal is limited by temperatures near 80°F. Later in the season, potato psyllids will typically infest the lower plant canopy, thereby avoiding higher temperatures. However, as ambient temperatures increase and humidity decreases, even the shaded canopy cannot protect the psyllids. Under these conditions psyllids will take flight. The more controlled environments of greenhouses can provide a local source of infestation. Psyllids have been known to escape from the protection of greenhouses containing infested tomato (*Figure 8*) and pepper plants.

Figure 8. Psyllid adults infest a tomato plant.

How Can I Monitor for Psyllids?

Sampling tools such as yellow sticky traps, pan traps, or sweep nets can be used to detect psyllid arrival, but these cannot be used to determine if there is an economically important population.

To scout for potato psyllid nymphs (i.e., the stage associated with psyllid yellows) in potatoes, randomly select five groups of 10 lower leaflets throughout the field (50 leaflets total). Consider treating the field if there is more than one nymph per 10 leaflets on pre-flowering plants, or three to four nymphs per 10 leaflets on plants in full flowering or older. It is important to take samples representative of the entire field. Be aware of features in the landscape that may facilitate the adults' settling from the air. For example, a tree line can create eddies that could concentrate psyllid numbers in fields downwind. Psyllids may invade fields from borders with weeds such as ground cherry or nightshade.

How Can I Control Psyllids?

Host Plant Resistance

In potato, there have been few reports of resistance against potato psyllids. Some studies have reported some resistance to psyllid yellows in some varieties, but not against psyllids.

Cultural Control

Planting date can impact psyllid establishment. In potato, an early-planted crop could allow plants more time to develop a full canopy. The canopy offers arriving psyllids more shade and facilitates their development, but the plant will show less growth retardation. Conversely, a later-planted crop may not afford potato psyllids the same protection and may discourage psyllid development; however, if infested, the plant will have more injury.

Biological Control

There are a number of natural enemies that feed on psyllids: lady beetles, minute pirate bugs, damsel bugs, lacewings, and other natural enemies. Although these are voracious feeders and will eat any psyllids at any developmental stage, their effect on populations is modest and far less important than weather conditions. There is also a parasitic wasp, *Tetrastichus triozae*, that attacks psyllids (including potato psyllids). However, the populations of this beneficial insect do not occur at the optimum time of year for effective potato psyllid control.

Chemical Control

A number of chemical control options are available for potato psyllids (*Table I*). Because this insect prefers to live in the lower canopy and on the underside of leaves, applicators should be aware of any special pesticide needs for coverage and canopy penetration. Although there have been no documented cases of insecticide resistance in potato psyllids, many of these chemicals are used to control other insect pests. Therefore, it is important to rotate between chemical families to help prevent pesticide resistance from developing. *Table I* lists the chemical classes and mode of action of insecticides available for control of the potato/tomato psyllid.

Table I. List of common chemical families, mode of action, and some common formulations currently available for potato psyllid control in potato.

Chemical Family	*Mode of Action*	*Example Active Ingredients*
avermectins	Group 6: chlorine channel activator	avermectin
pyrethroids/pyrethrins	Group 3: sodium channel modulator	bifenthrin, esfenvalerate, lambda-cyhalothrin, permethrin
neonicotinoids	Group 4A: nicotinic acetylcholine receptor agonist	imidacloprid, thiamethoxam, chlothianidin
organophosphates	Group 1B: acetylchoinesterase inhibitor	phorate
tetronic and tetramic acid derivatives	Group 23: acetyl CoA carboxylase inhibitor	spiromesifin
Azadirachtin*	Group UN: unknown	neem oil, azadiractin

*Azadiractin sprays, such as Aza-Direct®, are acceptable for organically certified produce.

Quick Review

Appearance:
Adult — black with white markings when older, wings without markings; 1/10 inch long
Egg — orange-yellow, attached to leaves
Nymph — pale green; tiny, flat, scale-like

Life Cycle:
Overwinters in the Rio Grande River region
Adults migrate north; influenced by wind and temperature
One to four generations, season depending on geography, temperature, and host

Damage:
Adult — Indirectly; it is a vector for zebra chip pathogen.
Nymph — Directly; it injects a toxin causing psyllid yellows and slows growth of vine and tubers; may transmit pathogen causing zebra chip that causes discoloration during cooking.

Management:
Cultural control — Delay planting
Biological control — Lady beetles, minute pirate bugs, damsel bugs, and others
Chemical control — neonicotinoids as in-furrow or foliar treatments or other foliar applications as labeled at threshold.

Additional Resource

Additional information on potato psyllids, psyllid yellows, and zebra chip is available on the website Potato Education Guide (*http://cropwatch.unl.edu/potato*).

This publication has been peer reviewed.

UNL Extension publications are available online at *http://extension.unl.edu/publications*.

Index: Insects & Pests
Field Crop Insects
Issued February 2012