Potato Psyllid Overwintering and Identification on Yellow Sticky Traps

Andrew S. Jensen
Regional Research Director, IPC, OPC, WSPC

Overwintering Studies

Introduction

Since the first report of zebra chip (ZC) in the potato crops of the U.S. Northwest (Idaho, Oregon, and Washington), there has been much interest in the biology of potato psyllid, *Bactericera cockerelli*, in the region. The potato psyllid (Figure 1) has been known to occur regularly in the Columbia Basin of Washington and Oregon for over 20 years, based on the personal observations of the author, and was documented to appear in potatoes annually by Munyaneza et al. (2009). Previous to the link between ZC and potato psyllid, there had been almost no research on, or attention paid to, the psyllid in Northwest potatoes. This is because it was widespread but usually in very low numbers that did not warrant control. The advent of ZC in the Northwest raised urgent questions about the psyllid's biology outside the crop, including whether it could overwinter in the region. Therefore, studies were undertaken to identify a non-crop plant that might serve as an overwintering host for the psyllid. The author consulted the *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973) for perennial species of Solanaceae in the region that overwinter with dormant above-ground parts. *Solanum dulcamara* L. was the species listed that fit these criteria. Also known as bittersweet nightshade and bitter nightshade (Figure 2), this plant is a perennial vine that loses its leaves in late fall and re-sprouts from abundant buds on the vines in early spring. It is a weed of natural and semi-natural habitats near streams, rivers, canals, lakes, springs, and similar wet places.

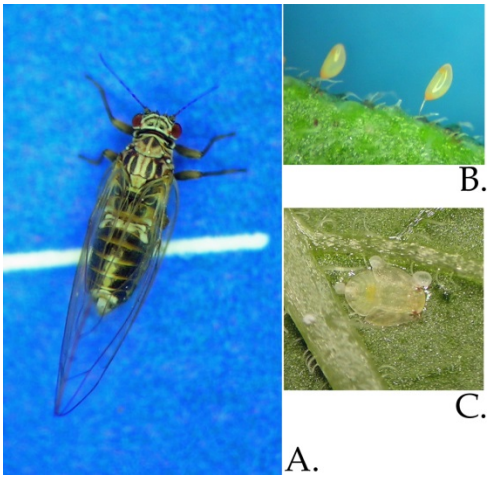


Figure 1. Potato psyllid life stages: A. adult, B. egg, C. nymph.

Materials and Methods

Sampling of *S. dulcamara* plants, conducted by the author, began in various parts of the Northwest during routine travels for other purposes. Plants were sampled wherever found using a combination of leaf/stem picking and beating sheet techniques. Insects were identified using a stereomicroscope, where appropriate. Lab rearing of potato psyllids was accomplished on rooted cuttings of *S. dulcamara* and potted potato plants grown at room temperature (~65º F) under ambient lighting conditions. Samples from the field and lab colonies were preserved on several occasions in the personal collection of the author.

Results and Discussion

On October 24, 2011, *S. dulcamara* plants growing along a stream in Stanfield, OR were found that hosted immature psyllids. Cuttings from this location were returned to the author's home in Idaho where psyllids were reared to adult and confirmed to be potato psyllid. This was apparently the first documentation of *S. dulcamara* as host of potato psyllid.

Figure 2. Bittersweet nightshade, *Solanum dulcamara,* growing over a canal on an abandoned bridge. Inset: the distinctive purple flowers of *S. dulcamara*.

Following up on this find, two sites near Star, ID (one found in November 2011, the other in February 2012) and one near Caldwell, ID (found in January 2012) were confirmed to host potato psyllids. All three sites were large patches of *S. dulcamara* growing along a ditch or canal that contained water throughout the year. The first site located near Star was monitored into the middle of December 2011 with all stages of the psyllid present. Following complete leaf drop by the plants on about December 20, only adult psyllids were found at this site until spring. The other two sites, i.e. one near Star and one near Caldwell, were found after complete leaf drop during mid-winter. Adult psyllids were easily shaken from the plants at both sites in mid-winter. On February 1, 2012 stem cuttings were established in a vase to observe dormancy break in the plant. On February 13 cuttings had roots and shoots and were potted in potting soil for establishment of a lab colony. Three psyllids were collected from the field on February 23 and March 3 and introduced to the potted *S. dulcamara* plant. Copulation was observed on March 4 and eggs were found on the plant on March 10. The eggs hatched

and these psyllids developed to adults by April 8. In the field, eggs were found on *S. dulcamara* beginning on April 16 in Caldwell, and late-instar nymphs were present by May 4, conclusively demonstrating overwintering. Psyllids collected from *S. dulcamara* were placed on a potted potato plant, and successfully established a population on this plant that persisted until it was terminated in mid-July.

This work demonstrated for the first time that *S. dulcamara* is a good host for potato psyllid. It also showed that potato psyllid can overwinter in the adult stage in the Northwest in association with *S. dulcamara*. Questions remain, however, including whether this host plant and overwintering biology are important for the development of ZC disease in the Northwest potato crop.

Acknowledgements

This research was supported by Washington State Potato Commission, Idaho Potato Commission, and Oregon Potato Commission.

References

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle. 730 pp.

Munyaneza, J. E., J. M. Crosslin, and J. L. Buchman. 2009. Seasonal occurrence and abundance of the potato psyllid, *Bactericera cockerelli*, in south central Washington. Am. J. Potato Res. 86: 513-518.

Potato Psyllid Monitoring Using Yellow Sticky Traps

Preliminary study of yellow traps as a monitoring tool for potato psyllid led to the following instruction document for use in the field and the trap evaluation lab.

Psyllid Monitoring with Yellow Sticky Cards

Andy Jensen, Regional Research Director
Potato Commissions of Washington, Idaho, & Oregon

One of the most common ways to monitor psyllid populations in potatoes involves yellow sticky traps. Unfortunately for all of us, this task is made challenging by several factors, for example:

1. Psyllids are small.
2. Yellow sticky traps catch several other kinds of psyllids, even when placed in potato fields.
3. Psyllids are often obscured by the vast number of other insects also caught on the traps.

Below are some guidelines and photos that will hopefully be helpful for those of you who want to use yellow sticky traps to watch for potato psyllids.

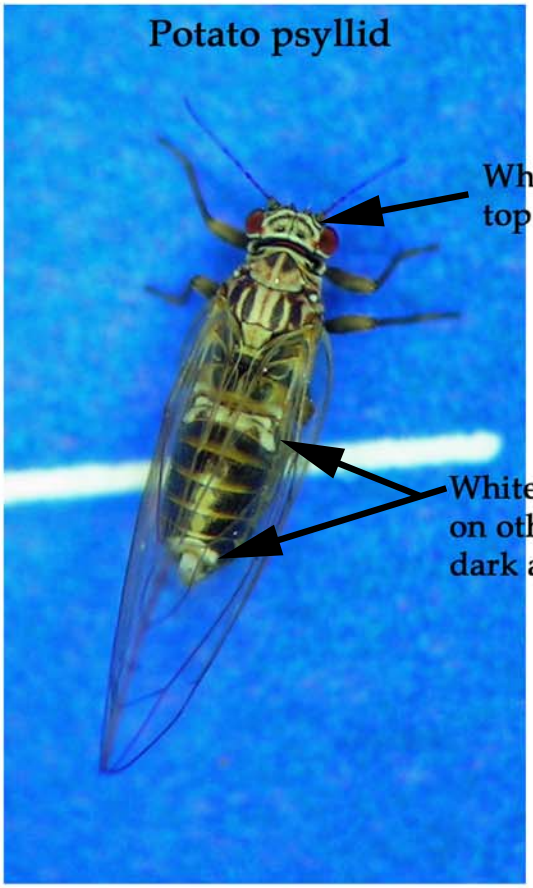
Setting the Traps

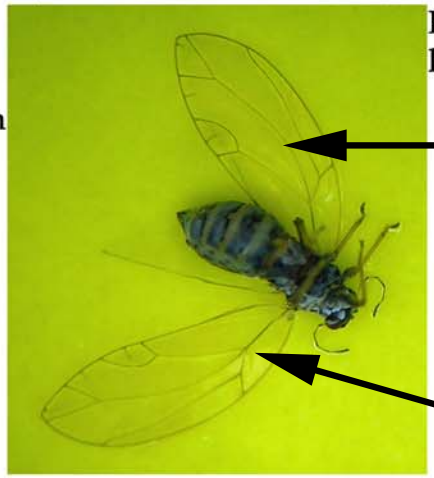
Traps meant to catch potato psyllids must be placed inside the potato fields, at about the height of the plant canopy. This contrasts to traps meant to catch beet leafhoppers, whch must be placed outside the crop. Traps should be placed near the field margin, within the outer few rows of potatoes.. How many traps per field? More is better, but as you'll see below, evaluating yellow traps for psyllids is challenging and time consuming.

Checking the Traps

Ideally, traps should be checked at least every few days. Traps should be changed once a week, or whenever they become covered in insects, dirt, feathers, hair, dead lizards, etc.

Potato Psyllid Features and Size

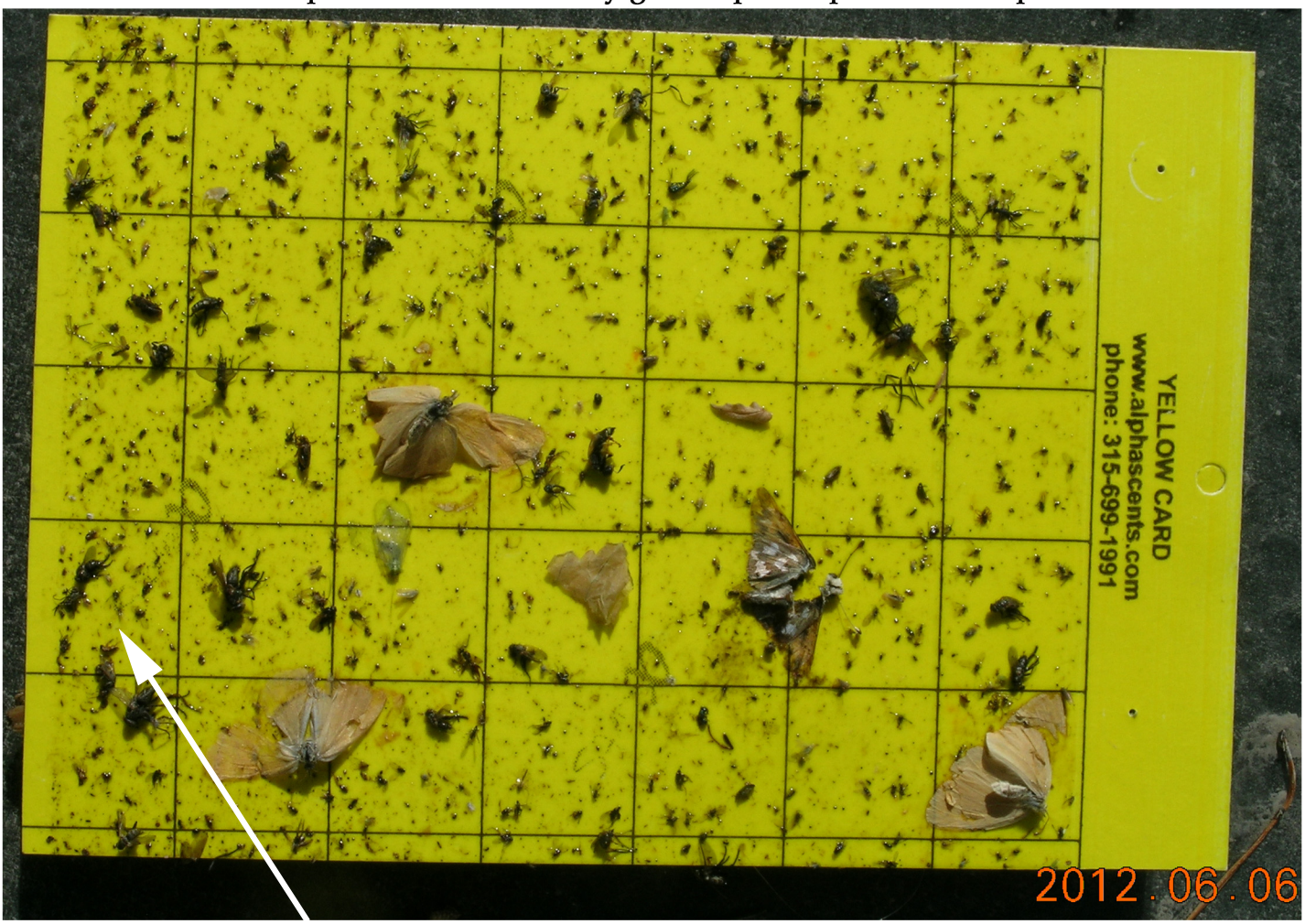




Recognizing Psyllids, and then Potato Psyllids, on Sticky Traps

Knowing which psyllids are potato psyllid is important because only potato psyllid can cause damage to potatoes. When evaluating yellow traps, the first task is to recognize the psyllids among all the insects and debris on the card. A strong magnifying glass or dissecting microscope is absolutely necessary. Without magnification, finding the psyllids on a card is very challenging, and identifying the potato psyllids is impossible.

Here is a card I experimented with in my garden potato patch. Each square is 1X1 inch.

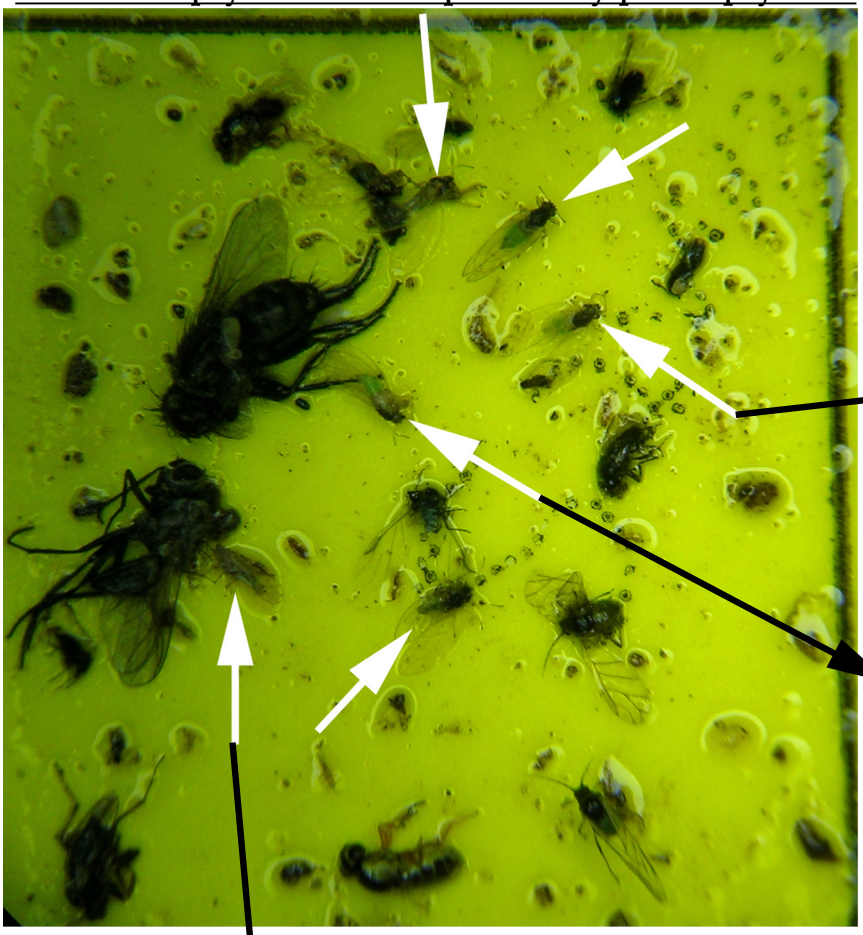


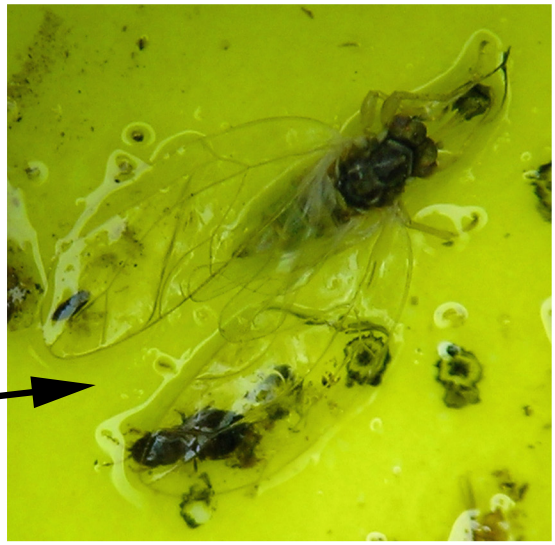
Let's focus on this square.

This is about 3X magnification; try to find the psyllids.

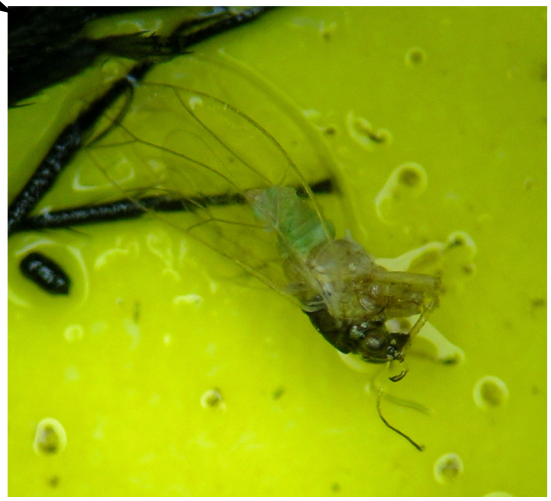
Recognizing Psyllids, and then Potato Psyllids, on Sticky Traps (continued)

There are 6 psyllids in this square. Any potato psyllids?





How about this one? Nope, abdomen is green, the head lacks white rim.



How about this one? Nope, abdomen is green, not dark/black.

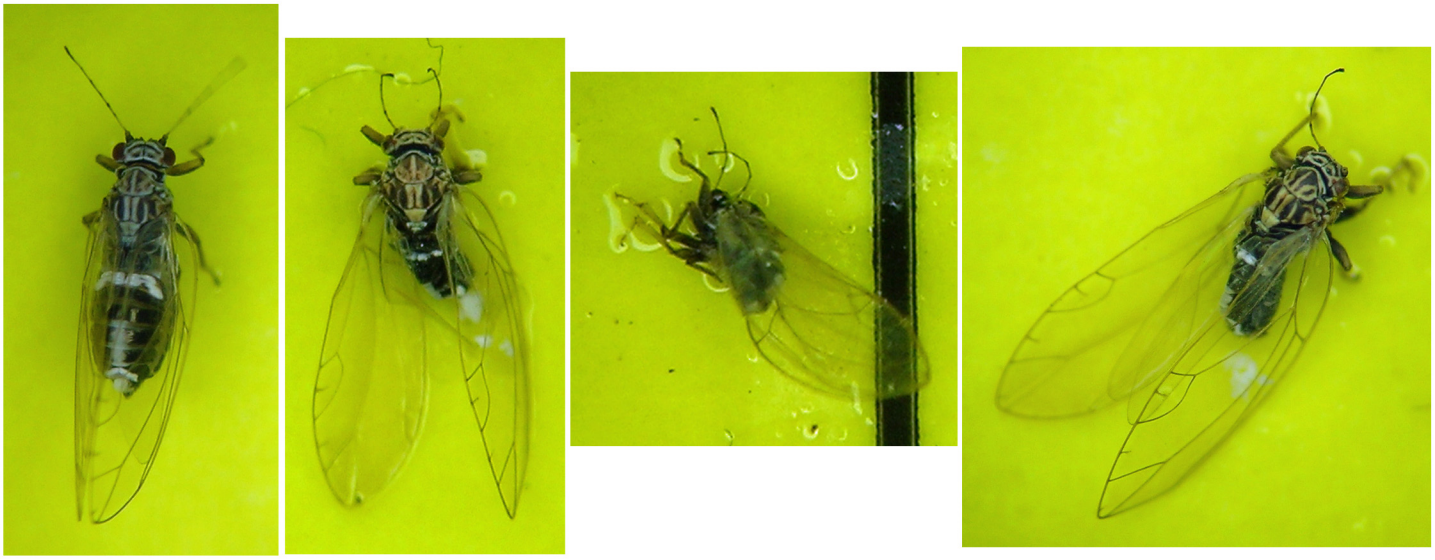
Seeing the wing veins takes a lot of magnification!

This one? Nope. Wing vein branches in two.

Bottom line: none of the 6 psyllids in this square were potato psyllids. In fact, none of the 40+ psyllids on this entire card, front and back, were potato psyllids.

Potato Psyllids Compared to other Psyllids

Photos of many psyllids, both potato psyllid and the other species, will hopefully help you calibrate your eye for recognition of the only damaging species, potato psyllid.



These four specimens are all potato psyllid. The one on the far left was alive when the photo was taken. After death on the card, psyllids shrivel to some degree and sometimes break into pieces.

These six specimens are **not potato psyllid**, and are representative examples of the type of specimens you will likely find on yellow sticky traps in the Northwest.