Exotic Pest Alert: Tomato-potato psyllid

Plant Biosecurity Orange

Tomato-potato psyllid (Bactericera cockerelli) is an exotic plant pest
This insect is a serious threat to Australia’s potato, tomato and capsicum crops
If found it must be reported promptly to the Exotic Plant Pest Hotline 1800 084 881

General symptoms caused by tomato-potato psyllids feeding on most host plants include yellowing, cupping and narrowing of individual leaves and the development of a purple tinge. These symptoms are similar to other potato and tomato disorders.

Psyllid damage

Tomato-potato psyllids have an extensive host range, but tomato, potato, capsicum, chilli and nightshade (solanaceous plants) are preferred. Infections on sweet potato and kumara (Convolvulaceae family) have been reported.

Adults and nymphs of tomato-potato psyllid cause injury to plants by feeding with piercing mouth parts. During feeding a salivary toxin is injected into the plant which leads to the condition called psyllid yellows (Figure 1). Feeding can result in loss of plant vigour and yield. Damage symptoms include stunting, chlorosis and purpling of leaves, distorted leaf growth and stem death.

The tomato-potato psyllid vectors the bacterium “Candidatus Liberibacter solanacearum” which causes the disease zebra chip. Zebra chip symptoms are very similar to psyllid yellows (refer to Primefact 1156).

In-crop signs of tomato-potato psyllid include:

- insects jumping from the foliage when disturbed (adult psyllids are sometimes called jumping plant lice as they readily jump and fly when disturbed)
- severe wilting of plants caused by high numbers of psyllids feeding
- yellowing of leaf margins and upward curling of the leaves caused by the injection of salivary toxins (called psyllid yellows) (Figure 1)
- honeydew and psyllid sugar making the plants sticky and often appearing dirty (Figure 2)
- shortening of stem internodes
- stem death

Figure 1 Psyllid yellows on potato caused by tomato-potato psyllids feeding

Figure 2 Tomato plant coated with honeydew and psyllid sugar excreted by tomato-potato psyllids
Symptoms in potatoes

Potato plants may have shortened internodes and aerial tubers may develop in the leaf nodes (Figure 3). Potato tops are likely to be smaller than normal. The foliage turns yellow and may have a burnt or purplish appearance. Stems may die completely but regrowth from the base may occur.

Tubers from affected plants may have small stalked tubers protruding from the main tuber (called ‘chaining’) and when cut may show internal browning of the vascular ring or brownish streaks along the medullary rays.

Symptoms in tomatoes

Foliage symptoms include leaf curling and yellowing. Plants may either become stunted or abnormally elongated. Fruit development is uneven. Tomatoes may be misshapen with a strawberry-like appearance, or no fruit is produced or there is an over-production of small, non-commercial grade fruit. Symptoms vary in severity between cultivars.

Symptoms in capsicums and chillies

Leaves of plants become misshapen, pale green or yellow with spiky tips. Leaf stalks appear stunted. Flowers may drop prematurely and parts of the plant may die back. Symptoms vary in severity between cultivars.

What is a psyllid?

Psyllids are sap-sucking insects.

There are three life stages.

Adult psyllids resemble cicadas in appearance but only grow to about 3 mm long (Figure 4). The body is brownish and has white or yellowish markings on the thorax and a broad white band on the abdomen. Wings are transparent and held vertically over the body.

Nymphs are 2 mm long, oval shaped and scale-like in appearance (Figure 5). Young nymphs are yellowish green to orange with a pair of red eyes and three pairs of short legs. Older nymphs are greenish and fringed with hairs and have visible wing buds. Nymphs look similar to scale insects.

Psyllid eggs are less than 1 mm long and are attached to the plant by a short vertical thread. They are usually laid on the lower surface of leaves or along the leaf stalk (Figure 6). Eggs are white when first laid then turn yellow to orange after a few hours.
Life cycle
Female tomato-potato psyllids mate 3-4 days after emerging as adults. They can mate more than once in their lifetime of approximately 40 days. Each female can produce up to 500 eggs.

Eggs hatch 3-9 days after being laid. Nymphs pass through five instars in 12-21 days depending on temperature, before becoming adults. The average lifecycle from eggs to adults takes 15-30 days.

Psyllids thrive at about 27 °C, while temperatures below 15 °C or above 32 °C adversely affect their development and survival. In conditions of average temperatures 4-5 generations per year could occur on outdoor host plants.

In protected cropping facilities, tomato-potato psyllid development progresses rapidly between 15-32 °C. The lower temperature threshold for development is about 7 °C.

Spread
The tomato-potato psyllid is probably a native of Central America. It has spread to North America and has established in many states in the USA and Canada.

The psyllid was detected in the Auckland region of New Zealand in 2006, and subsequent surveys have shown that it has spread throughout the North Island and over the northern half of the South Island.

Long distance spread of adult psyllids probably occurs by wind and thermal currents.

International experience
The tomato-potato psyllid has the potential to severely reduce yield and crop quality.

In the USA, losses in tomato crops have exceeded 80% (Figure 7). In potato crops in the USA and Central America yield losses greater than 60% have been reported.

Crop losses will be aggravated if the tomato-potato psyllid is vectoring "Candidatus Liberibacter solanacearum", the causal organism of zebra chip.

Between 2006-2009 the zebra chip disease complex with tomato-potato psyllid was estimated to cause losses in the Texas potato industry of US$33.4 million annually.

Between 2008-2011 New Zealand potato producers experienced losses of NZ$120 million associated with the presence of tomato-potato psyllid and the bacterium causing zebra chip.

Control measures
Overseas experience has shown that currently the only effective approach to managing psyllid yellows and zebra chip is to target the insect vector by using insecticides at planting (seed treatments) and by soil drenching and foliar applications during the cropping season.

Since the tomato-potato psyllid was discovered in New Zealand in 2006, potato industry organizations have invested more than NZ$0.5 million in management, research and extension activities.

Actions to minimise psyllid risks
Put in place sound crop hygiene including:

- remove alternative hosts and solenaceous weeds
- practise on-farm biosecurity to prevent entry, establishment and spread of pests and diseases
- ensure all staff and visitors are instructed in and adhere to on-farm hygiene practices
- regularly monitor your crop
- keep records

Reporting
If you suspect tomato-potato psyllid:
Call the Exotic Plant Pest Hotline on 1800 084 881
Take photos not samples to minimise the risk of spreading the pest
Contact your local district horticulturalist
Resources

AusVeg (2011) Fact Sheet – *The Tomato Potato Psyllid (TPP)*

Biosecurity Australia (2009) *Final pest risk analysis report for “Candidatus Liberibacter psyllaurous” in fresh fruit, potato tubers, nursery stock and its vector the tomato-potato psyllid*

Department of Primary Industries (2012) NSW Primefact 1156: Exotic Pest Alert – Zebra chip

Department of Primary Industries NSW - Plant Biosecurity website


Potatoes New Zealand – Psyllid resources

http://www.potatoesnz.co.nz/Overview/What-we-are-working-on/Psyllid-resources.htm

Figures 1, 2, 3, 4, 6 and 7 courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org

Figure 5 courtesy of Alton N. Sparks Jr., University of Georgia, Bugwood.org

An *exotic plant pest* is a disease causing organism or invertebrate not present in Australia and which threatens agricultural production, forestry or native and amenity plants.