

Tomato potato psyllid



Biological control results

Factsheet

About Tomato potato psyllid (TPP)

Tomato potato psyllid (*Bactericera cockerelli*) is a tiny sap-sucking insect which attacks a range of cultivated crops in the Solanaceae family including potato, tomato, eggplant, capsicum, chilli and tamarillo and weeds such as nightshade.

TPP damages plants by directly feeding on fruits with attached green material and leaves, and causes the disease psyllid yellows which can result in yellowing and stunting in tomato and potato plants.

TPP has also been identified as the vector of *Candidatus Liberibacter solanacearum* (CLso), the putative causal agent of Zebra Chip disease in potato. CLso has not been detected in Australia.

An Integrated Pest Management strategy (IPM) is recommended for the effective control of TPP.



TPP research and development

The Western Australian Department of Primary Industries and Regional Development (DPIRD) has completed a series of laboratory and glasshouse trials on the performance of insecticides and Biological Control Agents (BCA) on TPP.

Preliminary results of biological control trials are outlined in this factsheet.



L-R: Tomato potato psyllid adults and nymphs on the back of a leaf.
Mature adult TPP in comparison to a 5 cent coin.

Biological control

Several commercially available beneficial insects have been identified for potential use in biological control of TPP. There were significant differences in TPP consumption between BCAs tested.

To preserve beneficials, it is recommended that growers select insecticides that are compatible for use in IPM programs.

Predators

Several species of generalist predators including lacewings, ladybirds, mirid bugs, hoverflies and predatory mites feed on nymphs and adult TPP (Table 1).

All predators feed on a range of crop pests and are naturally occurring in some areas in Australia.

Lacewings

Larvae of the brown lacewing, *Micromus tasmaniae*, feed on all stages of the psyllid and occur naturally in field crops in Australia. In New Zealand, *M. tasmaniae* has been reported to feed on TPP in unsprayed potato crops.

The larvae of the green lacewing, *Mallada signata* are predators of aphids, moth eggs and small larvae, scales and whiteflies. In laboratory experiments, late instar larvae and adults consumed all life-stages of TPP.

Nymphs appeared to be more efficient consumers of TPP than adults.



Figure 1. Green lacewing, *M. signata* (A) larva and (B) adult. (C) *N. tenuis* nymph and (D) *N. tenuis* adult. (E) *O. tantillus* nymph and (F) *O. tantillus* adult.

True Bugs

Nesidiocoris tenuis is a natural enemy of whiteflies, moth eggs and small grubs. The minute pirate bug *Orius tantillus* and *N. tenuis* are both used for control of thrips and whitefly species in greenhouse crops.

Lab experiments showed that they predated on TPP, though were not as voracious as some lady beetle species and green lacewing.

Parasitoids

Tamarixia triozae parasitises late instars of TPP and has been imported into New Zealand for further evaluation.

In Australia, no parasitoids are commercially available for the control of TPP. However, Australia is regarded to be a 'hotspot' of psyllid diversity and it is possible that naturally occurring parasitoids are present.

Table 1: A list of potential candidate BCAs present in Australia.

Scientific name	Common name	Classification	Present in Australia
<i>Typhlodromalus limonicus</i> (Garman & McGregor)	Mite	Acari: Mesostigmata: Phytoseiidae	Unknown
<i>Chilocorus circumdatus</i> * Gyllenhal	Red Chilocorus	Coleoptera: Coccinellidae	Commercially available
<i>Coccinella transversalis</i> * Fabricius	Transverse ladybird	Coleoptera: Coccinellidae	Commercially available, naturally occurring
<i>Cryptolaemus montrouzieri</i> * Mulsant	Mealybug ladybird	Coleoptera: Coccinellidae	Native, commercially available
<i>Harmonia conformis</i> * (Boisduval)	Large spotted ladybird	Coleoptera: Coccinellidae	Native; commercially available
<i>Harmonia octomaculata</i> * (Fabricius)	Spotted ladybird	Coleoptera: Coccinellidae	Commercially available
<i>Hippodamia variegata</i> * (Goeze)	Adonis ladybird	Coleoptera: Coccinellidae	Commercially available
<i>Adalia bipunctata</i> (L.)	Two-spotted ladybird	Coleoptera: Coccinellidae	Native to North America; naturalized in Australia
<i>Cleobora mellyi</i> (Mulsant)	Southern ladybird	Coleoptera: Coccinellidae	Native, wide spread in Australia
<i>Coccinella undecimpunctata</i> L.	Eleven-spotted ladybird	Coleoptera: Coccinellidae	Native to northern hemisphere; naturalized in Australia & New Zealand
<i>Halmus chalybeus</i> (Boisduval)	Steel-blue ladybird	Coleoptera: Coccinellidae	Native
<i>Scymnus loewii</i> Mulsant	Loew's ladybeetle	Coleoptera: Coccinellidae	Unknown
<i>Melanostoma fasciatum</i> (Macquart)	Small hoverfly (Fly)	Diptera: Syrphidae	Native
<i>Orius armatus</i> * Gross	Minute pirate bug	Hemiptera: Anthocoridae	Native, Commercially available
<i>Orius tantillus</i> * (Motschulsky)	Flower bug	Hemiptera: Anthocoridae	Native, Commercially available
<i>Nesidocoris tenuis</i> * Reuter	Mirid bug	Hemiptera: Miridae	Commercially available
<i>Nabis kinbergii</i> Reuter	Pacific damsel bug	Hemiptera: Nabidae	Native
<i>Mallada signata</i> * (Schneider)	Green lacewing	Neuroptera: Chrysopidae	Native, commercially available
<i>Micromus tasmaniae</i> * (Walker)	Brown lacewing	Neuroptera: Hemerobiidae	Native
<i>Drepanacra binocula</i> (Newman)	Hook-tipped brown lacewing	Neuroptera: Hemerobiidae	Native

* Indicates potential biological control agents present in Australia (preliminary laboratory and glasshouse study under TPP Transition to management program).



Figure 2. Adult ladybird beetles: (A) *H. octomaculata*, (B) *H. variegata* feeding on TPP nymph (C) *H. conformis* feeding on TPP eggs and foraging on capsicum leaf, (D) *C. circumdatus* feeding on TPP nymph, (E) *C. montrouzieri* feeding of TPP nymphs and (F). *C. transversalis* feeding on TPP nymph.

Ladybird beetles (Coleoptera: Coccinellidae)

Several species of commercially available ladybird fed on TPP adults and nymphs in lab experiments.

The large spotted ladybird *Harmonia conformis* and the mealybug ladybird *Cryptolaemus montrouzieri* were effective predators of TPP in capsicum, tomato and potato.

In addition *Hippodamia variegata*, *Harmonia octomaculata* and *Chilocorus circumdatus* also fed on TPP.

SCIENTIFIC R&D IS CRITICAL TO IMPROVING OUR UNDERSTANDING OF TPP IN AUSTRALIA AND INCREASING MANAGEMENT OPTIONS AVAILABLE TO GROWERS.

Transition to management

TPP was detected in Western Australia in February 2017, prompting a comprehensive biosecurity response.

Following national agreement TPP could not be eradicated, a Transition to management plan was developed which aimed to improve the capacity of industry and growers to manage this pest and build confidence around the status of the bacterium *Candidatus Liberibacter solanacearum* (CLso).

The TPP R&D program was a major component of the Transition to management plan.



Visit agric.wa.gov.au/tpp for more information on the signs and symptoms of TPP.

This factsheet is an initiative of the national TPP Transition to Management Plan.

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Help limit the spread of the Tomato potato psyllid

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