Hort Innovation

Final Report

Project title:

Surveillance of tomato potato psyllid in the Eastern States and South Australia

Project leader:

Dr Calum Wilson

Team members

Raylea Rowbottom (TIA), Dr Paul Walker (TIA), Dr Geoff Allen (TIA), Dr Robert Tegg (TIA), Dr Stephen Quarrell (TIA).

Delivery partner:

Tasmanian Institute of Agriculture (TIA), University of Tasmania, Private Bag 54, Hobart, Tasmania 7001

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Level 8
1 Chifley Square
Sydney NSW 2000

Telephone: (02) 8295 2300

www.horticulture.com.au

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Summary

The tomato-potato psyllid (TPP), *Bactericera cockerelli*, is a serious biosecurity threat to Australian solanaceous crop industries. The psyllid feeds on the phloem of plants and can transmit the bacterium *Candidatus* Liberibacter solanacerarum (CLSo) which causes Zebra chip disease and psyllid yellows. Originally from North and Central America, the psyllid/disease pest complex has recently undergone a major expansion in range. TPP and CLSo were discovered in New Zealand in 2006 and on Norfolk Island in 2014. More alarmingly, TPP was found in Western Australia (WA) in early 2017 but, to date, the bacterium has not been detected. Both the vector and pathogen have had a devastating impact on the solanaceous crop industries wherever found, resulting in millions of dollars of losses annually through increased pest control and surveillance, reduced yields and disruption to commodity export markets. Consequently, the threat of the psyllid invading eastern States of Australia is considerable. Early detection of any incursion is essential to increase the chance of eradicating populations before they become established.

Since 2011, the Tasmanian Institute of Agriculture (TIA) has operated a surveillance program to monitor for incursions of TPP in eastern Australian processing potato crops using yellow sticky traps. Funding for the initial three-year project was extended to June 2017 and then again to June 2018. This document is a final report for the 2017-2018 project extension. After the discovery of TPP in WA, the project scope was broadened to include fresh potatoes and other solanaceous crops. A dedicated project coordinator was appointed to organize the distribution of an enhanced network of traps and to facilitate liaison with an expanded industry base and State Biosecurity counterparts. This was successfully accomplished in a short time frame to align TPP surveillance efforts to guarantee State level requirements for an Area of Freedom certificate. In addition to monitoring for incursions of TPP, we recorded numbers of native psyllids and potential psyllid predators caught on traps. Another important aspect of the project was the continued training of industry personnel in the identification of TPP and recognition of CLSo disease symptoms. This was achieved through a series of planned and invited presentations given by TIA personnel at meetings across eastern Australia, in conjunction with State counterparts. Extension material was produced and distributed by TIA to trapping participants and at meetings. Regular project updates were reported in industry publications.

Over 3,000 sticky traps were sent to participants in more than 70 locations in Tasmania, Victoria, New South Wales and Queensland. Nearly 50% of the traps were returned to TIA for screening after placement in crops. No TPP were detected during the trapping period. More than 6,400 native psyllids were caught on the traps but less than 3% belonged to same family as TPP (Triozidae). None of the native psyllids identified were known to feed on crop plants but were likely to have originated from surrounding vegetation. Low numbers of potential psyllid predators were caught at all locations, predominately lacewings (Hemerobiidae) and ladybirds (Coccinellidae). Data on potential psyllid predators provides a valuable baseline estimate of their present abundance in TPP free crops. We recommend the continuation of the TPP surveillance program to provide assurance of Area of Freedom status for industry stakeholders.

Through our early proactive engagement with State Departments of Primary Industries we have enabled a more coordinated approach to State surveillance activities. From this we have assisted in the delivery of information to Industry on the issues surrounding surveillance and State biosecurity. As a direct result of our coordination of TPP activities and surveillance we have enhanced the understanding of surveillance outcomes for industry with respect to Area Freedom and the importance of reporting results from surveillance activities of new and exotic pests. With the improved participation of growers from Solanaceae crops we have generated a comprehensive dataset that not only supports multiple States Area Freedom but also provides a baseline of data prior to an incursion of TPP which will support future research.

Keywords

Biosecurity threat; surveillance, sticky traps, Zebra chip; psyllid yellows; potatoes; tomatoes; capsicums; eggplants

Introduction

The tomato potato psyllid (TPP), *Bactericera cockerelli*, has recently undergone a considerable expansion in its range and become a major pest of solanaceous crops in several countries (see review by Walker et al. 2015 for references therein). Its pest status increased after it was established that TPP is the vector of a new species of 'Candidatus Liberibacter' bacterium (CLSo), which is associated with 'psyllid yellows' disease in several solanaceous crops and 'zebra chip' disease in potatoes. Both the vector and pathogen are currently absent in eastern mainland Australia and Tasmania. However, it is feared that they may become established in eastern States after their spread to New Zealand in the mid-2000s and to Norfolk Island in 2014. In 2017, TPP was reported infesting plants in gardens and commercial glasshouses in the Perth metropolitan area, Western Australia (WA). Subsequent surveys found that the psyllid was also present in regional areas outside Perth and it is now suspected that this pest may have been in WA for two or more years. Fortunately, to date, none of the WA psyllids have been found to be infected with the CLSo bacterium. However, populations of TPP are too well established to eradicate thus significantly increasing the threat of its spread into cropping regions of WA and eastern Australia.

TPP and CLSo could enter eastern Australia together or independently through the accidental or intentional importation on fresh fruit, potato tubers or nursery stock, or through hitchhiker transportation of psyllids on plant or non-plant material. As the eggs and first instar nymphs of TPP measure only 0.3 mm in length, they could readily escape detection. TPP most likely entered New Zealand as a result of smuggling psyllid-infected primary host material (possibly chilli peppers) from the Americas, rather than through the accidental transportation on consignments of fresh produce through regulated pathways. How TPP entered Norfolk Island and WA is currently unknown. Given the wide host plant range of TPP, the risk of importation of plant material contaminated with psyllids and/or infected with CLSo is not limited to the Solanaceae. Sweet potato is also a host plant for TPP in New Zealand, on which it can reproduce, although it is not a host plant in which CLSo can develop or survive in.

Another possible pathway of entry of TPP into eastern Australia is through long-distance dispersal by wind or flight from infested areas. In its native range TPP is highly migratory and each year populations spread from southern USA and northern Mexico on northerly air flows throughout the USA to as far north as Canada. Similarly, TPP may be capable of reaching Australia from New Zealand by travelling on strong easterly airflows. Such weather systems are relatively rare but can occur when several high-pressure weather systems (anticyclones) are situated at uncommonly southern latitudes (45–50°S) and form a blocking pattern over southeast Australia and the Tasman Sea extending to New Zealand. Conversely, strong westerly air flows may facilitate the spread of TPP from WA.

Yellow sticky traps are highly attractive to adult TPP, and they are used regularly to detect and monitor psyllid populations in New Zealand and North America. Yellow sticky traps are more effective at detecting low, early season populations of TPP than direct visual searches. Yen et al. (2013) stated that in the event of a suspected incursion by TPP in Australia, a program of surveillance using yellow sticky would be easy and time-effective to implement and maintain and would provide a high probability of detection if the psyllid was in fact present.

Cost-effective surveillance strategies are needed for efficient responses to biological invasions and must account for the trade-offs between surveillance effort and management costs. Less surveillance may allow greater population growth and spread prior to detection, thereby increasing the costs of damages and control (Epanchin-Niell et al. 2012). In February 2011, the Tasmanian Institute of Agriculture (TIA, University of Tasmania) initiated a surveillance program for TPP in the main potato growing regions of eastern Australia using yellow sticky traps (PT10001). This program was funded by Hort Innovation with co-investment from the potato processing industry (Simplot Australia Pty, McCain Foods Australia Pty, Smiths Snackfood Company and Snack Brands Australia) and the Australian Government. The trapping program formed part of a wider awareness campaign conducted by TIA in conjunction with the potato processing industry partners and several other agencies (including Potatoes Australia, AUSVEG, Department of Agriculture, Fisheries and Forestry and HAL). The initial three-year project was extended to July 2017 (PT14001) and then again (from potato and vegetable levy funds) to July 2018 to form the current project MT16016 with an expanded focus on potato and vegetable solanaceous crops. Final reports for PT10001 and PT14001 were submitted to Hort Innovation in 2014 and 2017, respectively. This document is the final report for MT16016 and details the activities over the trapping period from July 2017 to the end of June 2018.

Methodology

a) Trap protocol and distribution

Double-sided, yellow sticky traps (each side = 15 × 10 cm) (Bugs for Bugs Ltd, Mundubbera, Qld, Australia) were distributed to industry partners for placement in the field. Where sites were more remote and industry partners not available, traps were placed by members of the TIA research team. Trapping was mainly conducted in the potato growing regions of northern Tasmania (Devonport-Ulverstone, Scottsdale-Herrick), southeastern Tasmania (Swansea-Orford-Copping-Richmond), western Victoria (Ballarat) and northern Queensland (Bowen). Traps were also occasionally placed in various crops in New South Wales (Sydney), southern Queensland (Lockyer Valley), central Queensland (Bundaberg) and northern Queensland (Atherton Tableland). Traps were changed at approximately weekly or fortnightly intervals during the potato growing season and every 3–4 weeks at other times. Traps were suspended from wooden or metal stakes at crop canopy level.

In preparation for an increase in trap numbers going out and being returned from new participants, both residential and commercial, a few changes were made to surveillance trap packaging to that used in previous projects. Firstly, we included in the trap packages an information sheet about TPP, what to look for with respect to the different stages of the vector lifecycle and plant damage caused by vector feeding. There was also a monitoring guide (produced by IPM Technologies) included in the package. In addition, to improve grower participation and prompt trap return, a PO Box was organised in New South Wales for traps to be returned. This also enabled us to provide reply paid, priority post, envelopes to reduce the number of steps required to have traps returned. As traps were being directly sent to Paul Walker in NSW, we were required to obtain permission from the NSW State government for quarantine, plant pest material, to enter the state. This required us to include additional "Quarantine Plant Material – DO NOT OPEN" labels on all concealed packages that the traps were to be posted in.

For residential clients, their traps were all sent out in bulk with a letter detailing trap protocols in their surveillance package. We required all residential participants to set traps out once a month, leaving the traps out for one week. For small residential gardens, single traps were to be placed at crop canopy height, near or as close to host plants as possible. Most residential participants participated in the program for 6-8 months. For those residential participants that owned hobby farms or school farm plots we requested four traps per plot.

For commercial participants, we required them to replace traps on a weekly basis throughout the season, and if this was not possible, as frequently as possible. In compliance with previous trapping and what had been done in the past in other States and New Zealand, we required traps to be placed on 4 edges/regions of the crop paddock. Again, traps were to be placed at crop canopy height. Trap protocols were sent to growers in their surveillance package.

As the trap demand for commercial growers was great, and to ensure we maintained a supply of traps for dispersal, we set up regular monthly/quarterly intervals for traps to be dispatched to growers. Records were kept on the number of traps sent out and returned so that we could follow up where necessary.

b) Trap assessment

Envelopes containing traps received from project participants after exposure in the field were immediately frozen for at least one hour before opening to ensure all trapped insects were dead. The number of Psylloidea caught on traps was counted under a binocular microscope. All trapped Psylloidea were distinguished from the genus *Bactericera*, which is absent in eastern Australia, using the diagnostic characters and keys provided by the Australian Government Department of Agriculture Fisheries and Forestry (2012) identification protocol. Identification was aided by comparing trapped psyllids with validated voucher specimens of TPP obtained from New Zealand. Psylloidea catches on all traps from each region were identified to the family and genus level, using the keys of Hollis (2004). Major potential TPP predators caught on traps that counted were: damsel bugs, brown and green lacewings, red and blue beetles, ladybirds and hoverflies. Although spiders are a major group of potential TPP predators and were occasionally caught, they were not counted as yellow sticky traps are not an effective sampling method for this taxon.

Outputs

A requirement of this project was to engage with industry and to provide education on the tomato potato psyllid. We presented at several workshops around the country providing information on the psyllid vector, the origin of TPP, TPP biology, identification, host plants, possible means of vector movement and the TIA surveillance program. Where possible, we provided this training in conjunction with pre-arranged industry events to encourage participation, broaden outreach of the project and to facilitate liaison with as many industry partners as possible. At these events we provided information on the psyllid vector as well as contact details for the surveillance project.

As the peak in growing season approached, discussions at these workshops became more about border security, business continuity, quarantine, and movement of materials across State borders. At this point we begun to engage State Chief Plant Health Officers (CPHO) to assist with providing information to growers about particular jurisdiction handling of such matters.

Below is a summary of the activities undertaken.

Training workshops & Conferences

2017

25th May, IPM Workshop by Dr Paul Horne. Attendance/liaison & TPP handouts

15th June, Echuca, VIC. APTRC workshop educating tomato growers of TPP and surveillance

27th June, Forth, TAS. Surveillance update workshop and Biosecurity discussion with DPIPWE

18th July, Virginia, SA. Workshop on TPP identification, surveillance and reporting to industry

21st August, Mareeba, North QLD. Workshop on TPP identification, surveillance and reporting

22nd August, Bundaberg, QLD. Workshop on TPP identification, surveillance and reporting

24th August, Gatton, QLD. Workshop on TPP identification, surveillance and reporting

25-29th September, Brisbane. QLD SPPH Conference

26th September, Brisbane, QLD. Introduction of Alan Nankivell and future of research of TPP

27th October, Perth. WA Industry Summit. Meeting with Vietnamese grower to discuss TPP incursion.

14th November, Bowen, QLD. Industry event which we presented information on TPP

19-22nd December, Carrick and Thorpdale, VIC. TPP workshops with Government to discuss border security

2018

19th April, Precision Agriculture Expo, Hagley, Tasmania – meeting with Alan Nankivell

16th March, CPHO meeting, Hobart. Present information on TIA surveillance program

As the project gained momentum and the growing season commenced, our activities, and those of State departments, gained media attention. Many of the radio interviews were aimed at informing the public and growers of the threat of TPP, what was being done and how to be involved. Some of these were also a means to advertise local workshops.

Radio Interviews

4th May 2017, AgFest, LA FM interview

22nd August 2017 ABC Country Hour Bundaberg 22nd August 2017

The story was picked up by 4 stations around the country:

ABC Southern Queensland, News

ABC Wide Bay News

ABC Southern Queensland, Country Hour

ABC Tas, Country Hour

ABC Eyre Peninsula and West Coast, Country Hour

30th August 2017 Macquarie Radio Network Ltd. Interview

3rd October 2017 Country Hour Interview

6th October 2017 Weekly Times Interview

Newsletters & Articles

To improve the projects connection with industry and as a means of informing industry of TIA's activities within the TPP surveillance program, several updates were distributed through a range of digital media and networks:

2017

9th August, Protected Cropping Australia bulk email advertising surveillance program.

1-7th September, Tasmanian Country Newspaper, Cuppa TIA article.

6-29th November, VegNet newsletters were distributed through the following regions; East Gippsland, Victoria, Northern, Western and South Eastern, Victoria, Tasmania, South Australia, NSW, South Australia, Bowen, Queensland, Bundaberg, Queensland, and Lockyer Valley, Queensland

December/January 2017/2018 Potatoes Australia article p35

https://ausveg.com.au/app/uploads/publications/Potatoes-Australia_December-January-2018_Web.pdf

2018

March/April 2018 Vegetables Australia article p51

https://ausveg.com.au/app/uploads/publications/Vegetables-Australia_March-April-2018_Web-1.pdf

April/May 2018 Potatoes Australia article. Final Update p 32

https://ausveg.com.au/app/uploads/publications/Potatoes-Australia_April-May-2018_Web.pdf

May 2018, Veg Network Newsletters – Final update for Surveillance were distributed through the following regions; East Gippsland, Victoria, Northern, Western and South Eastern, Victoria, Tasmania, South Australia, NSW, South Australia, Bowen, Queensland, Bundaberg & Bundaberg Fruit and Vegetable growers, Queensland, and Lockyer Valley, Queensland

Also, a final report of the outcomes of the surveillance project was individually posted to all participating industry bodies and public participants in appreciation for their continual support and/or participation in the surveillance program. A more detailed report will be provided to State DPI along with the surveillance data sets by 30th June 2018. Also, a handful of Tasmanian industry partners have asked for their datasets which will be provided to them by the end of June.

Further awareness of the TPP trapping program was provided through the TIA webpage *http://www.utas.edu.au/tia/centres/vegetables/integrated-pest-management/integrated-pest-management/insects.* This site currently undergoing an update and will include a fact sheet on TPP, a surveillance summary for the 2017/2018 season and details on the ongoing surveillance program, what is involved and who to contact.

Outcomes

Collaborations

With the requirement of States to report Area Freedom for TPP it was necessary to collaborate with VIC, QLD, SA, NSW and TAS State CPHO and Surveillance coordinators to combine and coordinate TPP surveillance activities. As part of this process we developed, with Utas Legal, a Materials Transfer Agreement (MTA) in which all participating States signed to allow data sharing from surveillance activities. For information transfer to be achieved, TIA adopted the National Minimum Data Standards (NMDS) agreed on by all States. The relationships TIA established with State DPI were useful in providing training venues, biosecurity support at these training sessions and enabled a wider connection of attendee's. As a result, TIA was directly involved with the development of surveillance protocols in Tasmania and engaged in discussions with other State departments on surveillance activities, coverage and collaboration of data. We were also asked to present information of the TIA surveillance program, past and present, along with major findings from the current growing year at the CPHO quarterly in May 2018.

Many of the training workshops had the support of Callum Fletcher and Alan Nankivell (AUSVEG) providing the growers with an opportunity to meet the National coordinator of TPP activities, Alan Nankivell, and to be informed of the farm biosecurity program that was being run by Callum Fletcher. Callum also provided a live discussion with a New Zealand grower who had first-hand experience with TPP. Awareness of these workshops to growers was provided through both AUSVEG and vegetable grower networks. These connections enabled TIA to supplement pre-organised training events thus improving the transfer of information to as many growers as possible. As a direct consequence from the workshops, and direct contact with many State and National industry partners among all host crops in the family Solanaceae, the TIA surveillance program increased the surveillance conducted by agronomists/growers and expand State coverage of surveillance.

As a means of extending surveillance and training to glasshouse growers of tomato, eggplant, capsicum, and chili, TIA attended a tomato forum in Echuca, Victoria, where we provided information on TPP biology and introduced the TIA TPP surveillance program. Furthermore, TIA has provided surveillance information to the Australian Processing Tomato Research Council (APTRC), and Protective Cropping Australia (PCA) which was distributed to >800 recipients. From this we established a working relationship with several large tomato and capsicum processing companies and have had continual support from them throughout the season.

Discussions are also underway with Nicholas Woods, Plant Health Australia, to provide access to the AUSPestCheck database as a means of immediate transfer of surveillance information accessible, at different restriction levels, to both Industry and government. Facilitation of this database would minimise handling of data and centralise surveillance information. In addition, it would provide useful geographical mapped information for delimitation surveys if TPP was to be detected.

Involvement

Under this project, surveillance activity was reasonably well accepted by industry. The project continues to have support from major industry partners such as Simplot Australia, McCain Foods Australia, Snackbrands Australia and The Smiths Snackfood Company. The past season has seen additional involvement of other Agricultural agencies such as Serve-Ag, Agronico, Prospect Ag, Integrated Pest Management Consulting (IPMC), Australian Processed Tomato Research Council (APTRC) and Peracto.

There was excellent coverage of major potato growing regions in Tasmania covering South East and North of the State. Largely, this has been achieved through industry support both fresh and processed potato, small businesses, TAFE Tasmania, community gardens and residential surveillance in both the North and South of the State. TIA personnel also conducted trapping in processing potato crops in SE Tasmania.

Surveillance in Victoria was largely undertaken through industry, with surveillance traps being deployed through McCain agronomists in Ballarat. There was some coverage of tomato growers in the North of the State through the support of APTRC. This activity was a continuation of previous years surveillance activities through APTRC and Vic DPI although this year surveillance activities were distributed between both TIA and Victorian DPI.

New South Wales surveillance was also supported by APTRC with growers spanning both sides of the border. There was also surveillance covering potatoes during the peak of the season and glasshouse grown capsicum after potatoes were harvested. This was assisted by IPMC, Windsor.

Surveillance in Queensland had strong industry support from Prospect Agriculture who manage tomato crops in Bowen. This was continuous throughout the project, even after harvest and traps continued to be returned. A small potato crop in Gatton managed by Peracto and the University of Queensland was monitored early in the season.

There was industry support in South Australia to distribute traps supplied by TIA. We had regular contact with representatives from DJS Growers who manage both seed and commercial growers, however, there was overlap with DPI trapping and the growers they support. Therefore, participation in TPP surveillance in South Australia was solely coordinated by State DPI.

Trapping details

Over 3,000 traps were dispatched to project participants in over 70 locations within Australia (Figure 1) and 47% were returned after exposure in the field. Tasmania had the greatest number of traps returned (50%), with Queensland (27%), Victoria (15%) and NSW (8%) following closely behind.

From the 1,412 traps assessed, no TPP were detected but more than 62% of traps caught one or more native psyllids (Fig. 2). Over 5,900 native psyllids were caught and identified, with < 3% of these belonging to the same family as TPP (Triozidae). This was similar to the findings from trapping in previous years (Walker et al. 2015). It allowed the entomologist to rapidly discount the majority of native psyllids caught as not being TPP based on readily discernable differences in the wing venation between the Triozidae and other psyllid families (see TIA identification web pages: *http://www.utas.edu.au/tia/centres/vegetables/integrated-pest-management/integrated-pest-management/insects*.

Most of the native psyllids belonged to the genera *Ctenarytiana* and *Acizzia*. None of the psyllids are known to feed on solanaceous crops but were likely attracted to the yellow colour of the trap from surrounding vegetation such as eucalypts and acacias. The State with the greatest number of psyllids identified was Tasmania (5.2 psyllids/ trap) followed by Queensland (4.4 psyllids/ trap), with both Victoria and New South at 1.9 psyllids/trap and 1.7 psyllids/trap respectively. Queensland had the highest proportion of Triozidae (7.7% of all psyllids caught), followed by SE Tasmania (0.8%) and NW Tasmania (0.6%). No Triozidae were caught in NSW or Victoria.

Beneficial insects were also recorded from the traps, this included green & brown lacewings, damsel bugs, ladybirds, hoverflies and red & blue beetles. These insects have been recorded feeding on different life stages of TPP in New Zealand (Walker et al. 2015). Overall there was over 4,400 beneficial insects identified. Captures of beneficial insects was highest in New South Wales (6.4/trap) with Queensland the lowest (0.9/trap). Over 50% of beneficial insects caught were brown lacewings, while ladybirds constituted 39% ladybirds, and hoverflies 8% (Table 1; Fig. 3).

Figure 1: Map of Australia showing the location of yellow sticky traps used to monitor for incursions of the tomato-potato psyllid during the 2017/2018 growing season.

Table 1: Number of native psyllids and beneficial insects caught on yellow sticky traps placed out across Australia during the 2017/2018 season.

	New South Wales	*Queensland*	*Tasmania*	*Victoria*
No. traps	109	378	715	210
Psyllidae	187	1,504	3,680	398
Triozidae	0	153	24	0
Mean per trap	1.7	4.4	5.2	1.9
		Beneficial insects		
Brown lacewings	327	35	1,807	115
Damsel bug	0	3	1	2
Green lacewing	2	10	0	4
Ladybirds	365	246	984	120
Red & blue beetle	2	3	1	20
Hoverflies	3	16	309	41
Mean per trap	6.4	0.9	4.3	1.4

Figure 2: Frequency of traps catching native psyllids on yellow sticky traps from all trapping locations.

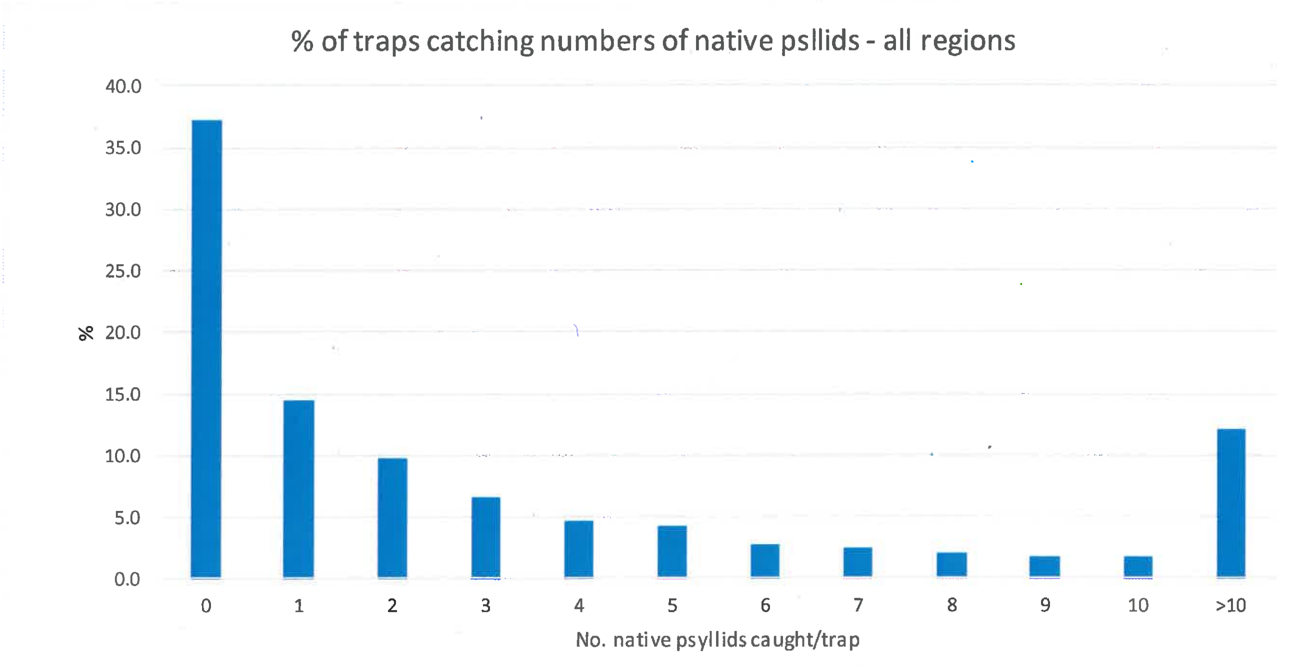
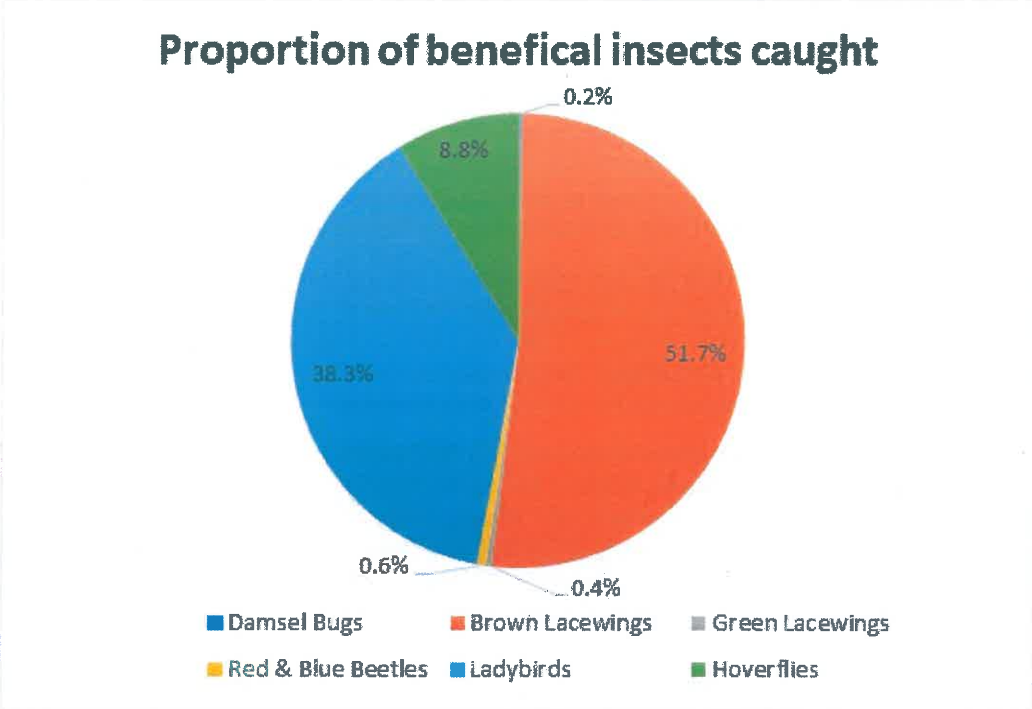


Figure 3: Proportion of beneficial insects caught on yellow sticky traps from all trapping locations



Ongoing surveillance

There has been ample support for the continuation of a TPP surveillance program with industry expressing the need for a means of early detection of TPP. This has been backed by discussions with State governments whereby expressions for greater collaboration and distinction of surveillance roles was necessary between TIA and DPI.

Monitoring and evaluation

At the commencement of our workshops, we provided single A4 feedback forms for growers to write comments on the content, delivery and additional information they may like in further workshops. Only one of these forms were returned from a seed potato producer requesting greater involvement of State DPI, biosecurity and quarantine, so that discussions around the formation of an industry group to discuss movement restrictions of host plants in the event of an incursion. We followed this up by coordinating a further workshop in which Andrew Bishop, Biosecurity Tasmania, was present to discuss quarantine related matters regarding an incursion of TPP. Given the larger numbers of attendees at this meeting, we believe we facilitated industries activity in the project.

At the conclusion of other workshops, many government representatives have indicated how necessary our addition was to the presentations in clarifying the role TIA have in TPP surveillance, our direct involvement with Government in providing additional data for State Area Freedom reporting and the provision of everything required to participate in TPP surveillance. This was particularly useful for growers to understand the combined efforts of both State governments and TIA towards Area Freedom.

Throughout the surveillance activities of the past year TIA have been contacted independently by representatives at Prospect Agriculture, Queensland, Agronico Tasmania, Simplot, McCain and State DPI expressing interest in the continuation of TPP surveillance, how to obtain training to identify key horticulture pests and what research will be undertaken to improve our understanding of psyllid movement, development and control in Australia. The project has strong support from State DPI with discussions focusing on improved collaborations with TIA, more efficient co-ordination of surveillance and improved trap efficiency.

The TIA surveillance project has had direct engagement with the public, industry and government to promote awareness and risk associated with TPP. We have provided pamphlets at large agricultural events, such as AgFest, Tasmania, presented information through media reports and participated in education and engagement activities with industry. Furthermore, we have supplied a brief training video on our webpage which had 23 views in two months. Additional evidence of the impact our activities have had come through direct invitations to present workshops or information about the project. One request came from the Vegetable Industry Development Officer in North Queensland to provide our workshops to the growers in the region. The other was directly from Biosecurity Tasmania where we were asked to provide details of the project in a closed meeting between the State Chief Plant Health Officers. Finally, we have had contact from residential participants within Tasmania thanking us for the ability to be involved in the surveillance project and for the final feedback report which was provided to all participants.

Recommendations

Future recommendations for this project are:

Continuation of surveillance program for TPP incursions in eastern Australia.

Mathematical modelling of surveillance to improve trap distribution, frequency and efficiency.

Scout Training.

As a base level, surveillance would need to be continued to ensure any new detections of TPP are identified. It is proposed that this be undertaken in a similar manner to what TIA has done during the 2017/2018 season, however, a more structured coordination of trapping would be required with State governments.

To improve surveillance methods and optimise the efficiency of surveillance nation-wide, we would need to apply mathematical modelling. To achieve this, data would be required from regions in New Zealand or Western Australia that have undergone regular seasonal surveillance. From this data we could work out the surveillance requirement necessary for each State based on independent risk analysis, land mass of host material and environmental factors. This information would inform the current surveillance being undertaken in each State and improve confidence that surveillance is adequate in detecting TPP. In addition, these models could be applied to surveillance of multiple target pests affecting the horticulture industry.

An optimal recommendation for future TPP activities would be the coordination of TIA with AUSVEG, to design and run workshops, training scouts from industry on the identification of 10-20 key pests. We would design and produce easy to follow guides in pest identification, establish a database of scouts and DPI representatives in each region for surveillance activities to be coordinated, and provide hands on training for growers. The intention of these training workshops would be to provide industry with the knowledge and support to facilitate more valuable farm biosecurity practices and build on industry/government relationships.

Refereed scientific publications

Journal article

In preparation: Walker P, Rowbottom R, Allen G, Tegg R & Wilson C. Further surveillance for incursions of the tomato-potato psyllid, *Bactericera cockerelli*, (Hemiptera: Triozidae) in eastern Australia. For submission to Austral Entomology.

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Intellectual property, commercialisation and confidentiality

No project IP, project outputs, commercialisation or confidentiality issues to report.

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Appendices

April/May 2018 Potatoes Australia article. Final Update p 32

https://ausveg.com.au/app/uploads/publications/Potatoes-Australia_April-May-2018_Web.pdf

TPP Fact Sheet which will be published on the new TIA web page which is to be released in July 2018. See attachment of the fact sheet.

The TIA web page contains details of past present surveillance activities as well as an archive of data for tomato potato psyllid surveillance. There is also a digital taxonomic key to aid with TPP identification.

http://www.utas.edu.au/tia/centres/vegetables/monitoring-psyllids-and-psyllid-predators-in-australian-potato-crops/surveillance-programme

UPDATE ON NATIONAL TPP SURVEILLANCE PROJECT

The Tasmanian Institute of Agriculture has been coordinating national surveillance of the tomato potato psyllid across Australia, with over 3,000 traps sent to growers and industry members. Trapping Coordinator Raylea Rowbottom provides an update.

In the 2017/18 growing season, the Tasmanian Institute of Agriculture (TIA) has increased levels of surveillance for tomato potato psyllid (TPP) as part of the project *Surveillance of the tomato potato psyllid in the Eastern States and South Australia* (MT16016), a strategic levy investment under the Hort Innovation Fresh Potato, Potato Processing and Vegetable Funds.

Raylea Rowbottom has been coordinating the TPP surveillance program since April 2017. Several others make up the team, including Calum Wilson (Project Manager) and Paul Walker (Senior Entomologist) along with Geoff Allen and Stephen Quarrell.

This surveillance is focused on the early detection of adult psyllids using yellow sticky traps in the hope of improved chances of containment, control and eradication of TPP should it be discovered. The supply of traps is driven by industry demand, with TIA providing traps, as requested, to surveillance participants in Tasmania, South Australia, Victoria, New South Wales and Queensland. Information from this trapping also supports state-wide area freedom.

There are 18 participating industry partners across the eastern seaboard of Australia and Tasmania covering processed potato, fresh potato and processed tomatoes. Also participating are over 20 hobby farmers, community gardens/schools and urban/backyard growers. To date 3,049 traps have been dispatched, many of which have been sent in bulk to cover trapping in certain regions until April 2018. Since September, over 32 per cent of these traps have been returned – all of which have had no detection of TPP.

As part of trap assessment, the number of beneficial insects and native psyllids has been recorded. There have been several native psyllids identified (see Table 1). These psyllids are referred to as 'bycatch' as they are unlikely to be feeding on agricultural crops but come from native vegetation.

Beneficial insects caught on these traps assist in the balance of the ecosystem by consuming insect pests such as aphids, scale, whitefly and other psyllid species. On average, numbers of beneficial insects per trap have been low, and dominated by lacewings and ladybirds (see Table 2).

SURVEILLANCE TRAPS RETURNED

LOCATION	NUMBER OF RECORDS
New South Wales	86
Queensland	220
Tasmania	623
Victoria	172

NATIVE PSYLLIDS AND BENEFICIAL INSECTS DETECTED

STATE	PSYLLIDAE*	TRIOZIDAE*
New South Wales	0.3609	0
Queensland	0.3390	0.0445
Tasmania	0.6727	0.0046
Victoria	0.2538	0

Table 1: Average number of Psyllidae and Triozidae on traps per day of surveillance. These psyllids are Australian native psyllids that do not feed on Solanaceae crops.

	NSW	QLD	TAS	VIC
LADYBIRD	0.3189	0.0207	0.1409	0.0313
OTHER LADYBIRD	0.2096	0.0581	0.0132	0.0031
BROWN LACEWING	0.5409	0.0149	0.3116	0.0662
DAMSEL BUG	0	0.0014	0.0002	0.0016
GREEN LACEWING	0.0030	0.0012	0	0.0032
HOVERFLIES	0.0033	0.0036	0.0376	0.0319
RED & BLUE BEETLE	0.0031	0	0	0.0082

Table 2. Average number of beneficial species on traps per day of surveillance.

SURVEILLANCE TRAP DISTRIBUTION

INFO

If you would like to be included in the surveillance program, please contact Raylea Rowbottom on 0428 745 752 or raylea.rowbottom@utas.edu.au.

For more information on the project visit utas.edu.au/tia/centres/vegetables.

This project has been funded by Hort Innovation using the fresh potato, potato processing and vegetable research and development levies and contributions from the Australian Government.

Project Number: MT16016

Common scab on potato. Image courtesy of R.W. Samson, Purdue University, Bugwood.org.

TACTICS TO AVOID ECONOMIC LOSSES FROM COMMON SCAB

Common scab is caused by the bacteria-like organism *Streptomyces scabies* and it is a prevalent soil- and seed-borne disease that occurs in potato growing regions throughout the world. Syngenta Technical Services Lead Dave Antrobus explains what short- and long-term tactics potato growers can use to control common scab in their crops.

Fundamental to avoiding significant losses to common scab in potato are background knowledge about the paddock you're planting into and an understanding of how a combination of different control measures will work best for you.

For growers, there is a lot of information on common scab. Agriculture Victoria has a good technote (AG0313) and more valuable material is available on the Cornell University website (plantclinic.cornell.edu/factsheets/commonscabpotato.pdf). I'll summarise their main points here.

Common scab is caused by *Streptomyces scabies*. This disease overwinters in the soil and can also be seed-borne. It can survive for a very long time in alkaline soils and becomes increasingly scarce in acidic soils.

DO YOU KNOW YOUR SOIL PH?

Information you should know is the pH of your soils. As a rule, within a soil pH range of five to eight, the incidence and severity of potato scab increases with increasing alkalinity. Scab usually remains at a satisfactorily level where soils are pH 5.0 to 5.2. At neutral pH of 7.0 and above, this disease can be severe.

For growers considering liming, it may be best to hold off until after the potato crop is grown and harvested as applications in the lead-up to planting can greatly increase the risk of common scab infection.

Fertilisers that impact soil pH can also impact on this disease. A lot of people think that animal manures have a lower soil pH in the same way that commercial nitrogen fertilisers do. However, many animal fertilisers (for example, those sourced from chicken egg farms) can raise soil pH substantially. The main reason is due to the lime-like materials such as calcium and magnesium in the manure. Similarly, wood ash can make the soil more alkaline.

The lowering of soil pH with applications of sulphur has proven useful in reducing scab in some soils of high pH. The use of acid-producing fertilisers such as ammonium sulphate as a source of nitrogen can help.

Over the longer term, try to maintain soil pH levels between 5.0 and 5.2 by using acid-producing fertilisers such as ammonium sulphate. Avoid or limit the use of alkaline-producing amendments such as lime and manure.

WHAT OTHER TECHNIQUES CAN YOU USE?

Long rotations of five years or more between potato crops, preferably with legumes (but excluding beets, carrots, parsnips and fleshy-rooted crucifers), are useful in reducing the severity of potato scab.

If your paddocks have a history of scab, plant resistant varieties, obviously avoid susceptible ones and only sow clean certified seed.

MAXIM® 100FS is a seed treatment that will reduce the effects of common scab. It can be applied to the seed prior to storage, or at planting. In addition to providing suppression of seed-borne common scab, this product is relatively broad-spectrum and can also control black dot, fusarium dry rot, black scurf (*Rhizoctonia* spp.) and silver scurf.

Dry soil when tubers start to form, and for the five weeks after that, will increase the chances of common scab occurring. For this reason, growers should water regularly over this time and maintain soil moisture at field capacity. Pay close attention to irrigation on coarse-textured soils, due to their reduced moisture-holding capacity. Gravelly or sandy areas tend to dry out more rapidly and are often sites of heavy scab infection.

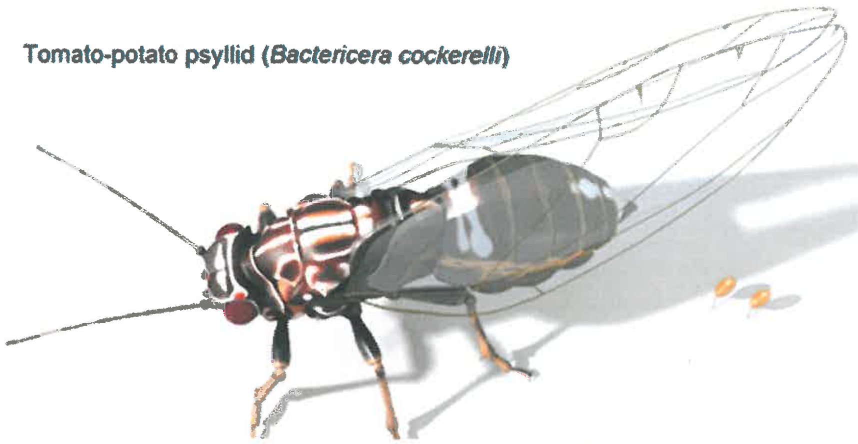
As with all disease control strategies, the combination of as many different methods as possible will ensure the best results.

INFO

For more information or to ask a question, please contact your local Syngenta Territory Manager, the Syngenta Advice Line on 1800 067 108, visit syngenta.com.au or email *Potatoes Australia* info@ausveg.com.au. Please note that your questions may be published.

The R&D content for this article has been provided to *Potatoes Australia* to educate Australian potato growers about the most relevant and practical information on crop protection technologies and their on-farm applications.

Fact Sheet



Tomato-potato psyllid (*Bactericera cockerelli*)

tia

TASMANIAN INSTITUTE OF AGRICULTURE

utas.edu.au/tia

What is it?

The tomato potato psyllid (TPP) is a small plant sucking insect of national importance for vegetable growers. The psyllid is a known vector for the bacterium (*Candidatus Liberibacter solanacearum (CLso)*) which causes 'Zebra Chip' in potatoes. TPP affects a range of plants including potato, tomato, eggplant, capsicum, chilli, tamarillo, goji berry and sweet potato.

What is the "TPP complex"?

The tomato potato psyllid causes significant plant damage to crops resulting in stunted growth, "psyllid yellows", necrosis, and premature plant death in heavy infestations. The psyllid can also carry the bacterium Clso and when present together form the TPP Complex.

Where is it?

In February 2017 the tomato potato psyllid was discovered in Western Australia. This has resulted in export restrictions and more than 420 km quarantine zone around the CBD. To date, the bacteria has not been detected.

At present the psyllid remains contained to Western Australia. All State governments and TIA, with the support of industry, continue to provide surveillance of TPP through the placement of sticky traps.

Key Points

- TPP is a major threat to the potato, tomato and capsicum industry.
- All potato cultivars appear to be susceptible.
- TPP causes severe damage to plant growth and yield.
- The bacteria causes Zebra Chip disease in potatoes and reduces potato marketability.
- Presence of the psyllid results in restricted plant movement across borders.
- The psyllid is yet to be present in any other State other than Western Australia.
- The bacteria (Clso) remains undetected.
- Surveillance of all susceptible crops remains the best way to monitor for the psyllid.

Raylea Rowbottom

National TPP surveillance coordinator

Tasmanian Institute of Agriculture

Email: raylea.rowbottom@utas.edu.au

February 2018

UNIVERSITY of TASMANIA | Tasmanian Government

TIA is a joint venture of the University of Tasmania and the Tasmanian Government

Above: TPP eggs and **Below:** nymphs and adult TPP

Photo credit: Western Australian Agriculture Authority (Department of Agriculture and Food WA)

Psyllid movement

The psyllid can spread through movement of infected plant material although can also disperse through natural pathways such as flight and wind dispersal.

Adult psyllids are distinguishable by their white markings across the abdomen and across the thorax. For a more detailed taxonomic description of TPP and to view past and present surveillance activities follow this link:

http://www.utas.edu.au/tia/centres/vegetables/monitoring-psyllids-and-psyllid-predators-in-australian-potato-crops/surveillance-programme

Signs of TPP

- TPP eggs are yellow in colour and are on short stalks, typically along leaf margins.
- Nymphs are 2mm, "flat" and oval shaped with red eye spots and a fringe of hair surrounding the body.
- Adults tend to jump vertically when disturbed hence the term "jumping plant lice".
- Foliar symptoms such as yellowing of leaf margins and upward curling of the leaf margins.
- Honewdew is a by-product of plant feeding from psyllids and can be a food source for ants.
- Sightings of TPP must be reported to:

Exotic Plant Pest hotline

1800 084 881

Hort Innovation

The Surveillance of the tomato potato psyllid in the eastern states and South Australia (MT16018) is a strategic levy investment under the Hort Innovation fresh potato, potato processing and vegetable Fund.