

# **Development of a contingency plan for Zebra chip complex**

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Plant Health Australia

Project Number: PT10018

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This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the potato industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of the potato industry.

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ISBN 0 7341 2548 8

Published and distributed by:  
Horticulture Australia Ltd  
Level 7  
179 Elizabeth Street  
Sydney NSW 2000  
Telephone: (02) 8295 2300  
Fax: (02) 8295 2399

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# **Final Report**

**Development of a Contingency plan  
for the Zebra chip complex**

**HAL project number PT10018**

**Jo Slattery and Dr Sharyn Taylor**

**Plant Health Australia**

**Potato –Fresh (R&D Levy) & Potato – Processed (R&D Levy)**

**31 January 2011**

**Horticulture Australia Limited Project Number: PT10018**

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**Report statement:**

This report summarises the outcomes of project PT10018 for the development of a Threat Specific Contingency Plan for the Zebra chip complex.

**Acknowledgement:**

PHA would like to recognise all who have contributed financially and in-kind to this project and development of the contingency plan, including

- Horticulture Australia Ltd
- AUSVEG
- Technical reviewers
- Zebra chip taskforce
- Potato technical advisory group



31 January 2011

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# 1. Media summary

Australia's geographic isolation and active quarantine systems have meant that the region has been relatively free of many pests that affect plant industries (including the potato industry) overseas. Freedom from these exotic pests is a real trade benefit for Australia in terms of securing market access domestically and internationally. Maintenance of our plant health status is vital for retaining existing trade opportunities, negotiating access to new overseas markets and ensuring the future profitability and sustainability of our plant industries.

The objective of this project (PT10018) was the development of a Threat Specific Contingency Plan for the Zebra chip complex. This plan will assist the potato industry prepare for an incursion of the Zebra chip complex by providing background information on the biology and available control measures for the Zebra chip pathogen (*Candidatus Liberibacter solanacearum*; syn. *Ca. L. psyllaurosus*) and its psyllid vector (*Bactericera cockerelli*), both of which collectively make up the Zebra chip complex.

For each component of the Zebra chip complex information on background, life cycle, host range, distribution and symptoms, diagnostic and surveillance activities to respond to an incursion, as well as possible control measures and management strategies are given, with the emphasis of this document on the management and control of the psyllid vector.

The development of the Contingency Plan for the Zebra chip complex was guided by the Potato Industry, AUSVEG and technical experts with expertise in this pathogen or psyllid, all of whom have contributed to the technical update and review of this plan.

As new research becomes available, this plan will need to be regularly reviewed and updated, to ensure it contains the latest possible information and up-to-date strategies to assist the potato industry.

## 2. Technical summary

Industry biosecurity is the protection from risks posed by organisms to each plant industry through actions such as exclusion, eradication, and control. Industry biosecurity is a shared responsibility involving governments, industry and the general community.

The objective of this project was the development of a Threat Specific Contingency Plan for the Zebra chip complex (*Candidatus Liberibacter solanacearum*; syn. *Ca. L. psyllauros*) and its psyllid vector (*Bactericera cockerelli*), both of which collectively make up the Zebra chip complex.

The Zebra chip complex has caused widespread destruction in both New Zealand and the United States costing the potato industries in these countries millions of dollars. With New Zealand's close proximity to Australia, the Zebra chip complex poses a major risk for the Australian potato industry.

The contingency plan was prepared to assist the Australian potato industry in its biosecurity preparedness in the event of an incursion of the Zebra chip complex or its individual pathogen or psyllid components. The information contained within this document is designed to:

1. Aid in an eradication or containment attempt by providing guidelines for steps to be undertaken or considered when developing a Response Plan to the Zebra chip complex.
2. Effectively manage the pest and minimise the disruption to agricultural industries following entry and establishment, should eradication be deemed not feasible.

In developing the Contingency plan for the Zebra chip complex, the following steps were taken:

1. Consultation with the potato industry including AUSVEG, the Zebra chip Taskforce and Potato Technical Advisory Group, major chemical companies, and researchers with technical expertise in the pathogen and/or the psyllid or IPM management.
2. Technical content collated from the most up to date research results.
3. Review of the Contingency plan by the Zebra chip Taskforce, Potato Technical Advisory Group and scientific researchers.

The benefits of a Contingency plan for the Zebra chip complex include:

1. A document which provides detailed information on the pests' life cycle, potential distribution, survival strategies and methods for surveillance, sampling and control.
2. Provision of information which will assist in the development of a Response Plan in the event of a detection of the Zebra chip complex, thus assisting with more rapid decision making for emergency response for eradication, containment or management of a pest incursion.

It is recommended that:

- As new information becomes available on the Zebra chip complex that this information be incorporated into the contingency plan.
- A preliminary workshop be held to review research activities being undertaken by researchers in Victoria and Tasmania.
- A comprehensive workshop be held in Australia with all sectors of the potato industry involved including representation from each of the potato growing regions. Key groups and individuals recommended for inclusion in this workshop are AUSVEG, the Zebra chip Taskforce, the Potato Industry Advisory group, growers, government agencies and researchers. Interested parties from New Zealand would also be invited.

In preparing this Contingency Plan, Australian researchers have identified a range of psyllid and *Liberibacter* areas needing further research that will provide a better understanding of the Zebra chip complex. Identifying and addressing these knowledge gaps will better prepare Australia in the event of an incursion of the Zebra chip complex.

Priority psyllid areas that were identified as requiring more research included:

- Surveillance and trapping methodology – an investigation of the potential to develop and test chemical traps based on psyllid pheromones or on plant volatiles is required
- Understanding pathways – a greater understanding of the impact of extreme low and high temperatures on the tomato potato psyllid (TPP) is needed to assist modelling possible natural pathways within Australia through movement of produce, cargo or wind currents
- Alternative host plants – an understanding of known alternative host plants of Solanaceous spp. and native Australian plants (including *Acacia*) as overwintering reservoirs of the psyllid is needed
- Natural enemies – Australia may have native psyllid parasitoids (*Tamarixia* spp) that could parasitise the Tomato potato psyllid (TPP) and act as biocontrol agents
- Transmission studies – understanding the biology of the *Liberibacter* and the psyllid with regard to transmission is considered a high priority

Priority *Liberibacter* areas requiring more research are:

- Validation of the molecular diagnostic tests in other known hosts (tomatoes, capsicums, and eggplant) to support validation of tests in potatoes
- Investigation of sampling strategies for *Liberibacter* in Solanaceous and other hosts to ensure the best time and tissue types are selected to reduce the risk of false negative results
- Confirmation and transmission and acquisition times of the *Liberibacter* by TPP – little information is currently available for potatoes and nothing is known for other hosts
- Knowledge on *Liberibacter* proliferation in TPP and its impact on transmission and spread – *in situ* studies using quantitative PCR, microscopy and hybridisation techniques are required
- Rate of *Liberibacter* translocation throughout the hosts after initial infection
- Relationship of TPP in transmission of Australian phytoplasma species and strains
- Presence of endemic *Liberibacter* species in the natural environment and the ability of TPP to transmit them should the psyllid enter the country

### **3. Introduction**

#### ***Background***

In global terms, the Australian potato industry is fortunate to experience relative freedom from many pests (invertebrates, pathogens [diseases] and weeds) that can adversely affect potato production and quality. Maintenance of this high plant health status is vital for retaining existing trade opportunities, negotiating access to new overseas and domestic markets and ensuring the profitability and viability of our potato industry.

Industry biosecurity is the protection from risks posed by pests through actions such as preparedness, risk mitigation, exclusion, eradication and control. No quarantine system, no matter how efficient, can ensure Australia's plant industries are totally protected from exotic pests and diseases and biosecurity is therefore a shared responsibility involving governments, industry and the general community.

Working together with Plant Health Australia, the potato industry through AUSVEG has commenced biosecurity preparedness by developing an Industry Biosecurity Plan (IBP). This document provides a framework for biosecurity activities within the industry and identifies the highest risk pest threats to production and trade.

A key part of industry preparedness for a possible incursion of an exotic plant pest is the development of contingency plans specific to high risk pests of the industry. Contingency plans provide detailed information on a pests' life cycle, current and potential distribution, survival strategies and methods for surveillance, sampling and control. Using this information, contingency plans form the basis for the development of Response Plans which are prepared following the detection of an exotic plant pest. If eradication is deemed not feasible, contingency plans will provide information on actions the industry should consider to best prepare for management of the pest. Through this mechanism, contingency plans provide a more rapid decision making process for emergency response for eradication, containment or management following a pest incursion.

Zebra chip is caused by a complex made up of a *Liberibacter*, the tomato/potato psyllid and possibly a *Phytoplasma*. It is a major pest of potato in New Zealand and also impacts on other solanaceae species. With the close proximity to Australia this pest complex is considered to be a high risk to Australia's potato industry.

As Zebra chip is a complex, the contingency plan developed in this project addresses information on what is known of the background, life cycle, host range, distribution and symptoms for each pest within the complex.

#### ***Aims and objectives***

The aim of this project was the development of a Contingency Plan for the Zebra chip complex that will assist the industry in the event of an incursion of the *Liberibacter* and/or the tomato/potato psyllid should the complex or its components enter Australia.

### ***Literature review***

The contingency plan was developed to provide an overview of Australia's potato industry preparedness for an incursion of the Zebra chip complex (psyllid and/or pathogens). The information for this plan has been primarily obtained from documents as cited in the reference section of the contingency plan and the draft diagnostic protocols developed for the Tomato-potato psyllid (*Bactericera cockerelli*) (Yen and Burckhardt 2010) and *Candidatus Liberibacter solanacearum* (syn. *Ca. L. psyllauros*) (Constable 2010).

### ***Implications and impact***

Development of a contingency plan for the Zebra chip complex will enable the potato industry through its peak body, AUSVEG, to make more informed decisions on eradication or management should the complex or any of its components be detected in Australia. Contingency plans are key biosecurity preparedness activities enabling a more rapid and efficient response to pest incursion.

## **4. Method and activities**

To remain consistent with other contingency plans, the Contingency Plan for the Zebra chip complex was developed using the contingency plan template guidelines developed by Plant Health Australia.

Information on the Zebra chip complex was gathered from a range of sources including literature reviews using electronic searches, information supplied by researchers, as well as consultation with representatives from the potato industry and the major chemical companies.

The process for development of the contingency plan included consultation with the potato industry including AUSVEG, the Zebra chip Taskforce and the Potato Technical Advisory Group (representing potato producers and processors- Pepsi Co, Simplot Australia, Harvest Moon, Frito-Lay, SP Exports, McCain). Major chemical companies were approached to provide comment and information on management with Bayer CropScience supplying a detailed protocol for control of the psyllid and researchers with technical expertise in the pathogen and/or the psyllid or IPM management (Vic DPI and consultants). Details of the individuals involved are shown in Table 1.

**Table 1** Individuals involved with development of the Zebra chip complex contingency plan

<b>AUSVEG</b>
Richard Mulcahy Hugh Tobin Andrew White
<b>Zebra chip taskforce</b>
Kevin Clayton-Greene (Harvest Moon) Brett Pemberton (Frito-Lay) Andrew Phillip (SP Exports) Frank Mulcahy (Simplot Australia) Tony Ford (McCain)
<b>Potato Technical Advisory Group</b>
Mark Heap (Simplot Australia) Peter O'Brien (Pepsi Co)
<b>Chemical company</b>
Anthony de Monte (Bayer CropScience)
<b>Technical researchers</b>
Alan Yen (Victorian Department of Primary Industries) Fiona Constable (Victorian Department of Primary Industries) Paul Horne (IPM Technologies)

After compilation of information into the contingency plan template, the document was sent to the above potato industry groups for comment and review.

## 5. Results

The development of a contingency plan for the Zebra chip complex is the output for this project (see attachment).

## 6. Discussion

Industry biosecurity is a core component in developing a world class, nationally coordinated plant health system. A part of preparedness for a possible incursion of an exotic plant pest is the development of contingency plans specific to high risk pests. Detailed information on a pests' life cycle, current potential distribution, survival strategies and methods for surveillance, sampling and control of the pest are used to form the basis for the development of Response plans.

The key output of this project has been a pest specific contingency plan for the potato industry. The benefits of a contingency plan for the Zebra chip complex include:

- Bringing together research and industry experts
- Provision of up to date information on the risk of this major pest complex to the potato industry. Key points from this contingency plan can be used to develop awareness material for the industry
- Development of a contingency plan for the Zebra chip complex is the first step in preparation of a Response plan.

## 7. Technology transfer

The primary (but not sole) audiences of contingency plans are industry leaders and government officials. The Contingency Plan will be made available to these groups through lodgement on the PHA website and if requested, through lodgement on the AUSVEG and HAL websites. Industry groups were informed of progress during this project via participation in meetings, phone calls and email.

Opportunity exists for development of awareness material to growers based on information within the Contingency Plan.

## 8. Recommendations

The Zebra chip complex has caused widespread destruction in both New Zealand and the United States costing the potato industries in these countries millions of dollars. With Australia's close proximity to New Zealand, there is an urgent need to increase Australia's preparedness and understanding of the Zebra chip complex.

It is recommended that:

- As new information becomes available on the Zebra chip complex that this information be incorporated into the contingency plan.
- A preliminary workshop be held to review research activities being undertaken by researchers in Victoria and Tasmania.
- A comprehensive workshop be held in Australia with all sectors of the potato industry involved including representation from each of the potato growing regions. Key groups and individuals recommended for inclusion in this workshop are AUSVEG, the Zebra chip Taskforce, the Potato Industry Advisory group, growers, government agencies and researchers. Interested parties from New Zealand would also be invited.

To better understand the Zebra chip complex Australian researchers have identified a range of psyllid and *Liberibacter* areas needing further research. Identifying and addressing these knowledge gaps will better prepare Australia in the event of an incursion of the Zebra chip complex.

Priority psyllid areas that were identified as requiring more research included:

- Surveillance and trapping methodology – an investigation of the potential to develop and test chemical traps based on psyllid pheromones or on plant volatiles is required
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## 9. Acknowledgements

PHA would like to acknowledge the following organisations that assisted in development of the Contingency plan for the Zebra chip complex:

- AUSVEG
- Potato technical advisory group (representing producers and processors)
- Zebra chip taskforce (including representation from Pepsi Co, Simplot Australia, Harvest Moon, Frito-Lay, SP Exports, McCain)
- Major chemical companies
- Technical reviewers (Vic DPI and IPM consultants)
- Horticulture Australia Ltd