Horticulture Innovation Australia

Final Report

Protecting Australia's citrus industry from biosecurity threats (with Addendum)

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Plant Health Australia Limited
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Summary

The Australian citrus industry currently enjoys freedom from many pests and diseases that impact production overseas. The recent detection and subsequent eradication of Citrus canker (Xanthomonas citri subsp. citri) from Queensland and recent incursions of Asian citrus psyllid and Huanglongbing in the United States have highlighted the importance and the need for the Australian citrus industry to take steps to ensure it is prepared for, and able to respond effectively to exotic pest incursions. This project was designed with the objective of strengthening industry planning and preparedness in relation to biosecurity and other risks, and to facilitate awareness of exotic pests and diseases.

To achieve these objectives, the project has developed a range of material. Key outputs from this project include: an audit of the current level of biosecurity activity in the citrus industry, the revision of the biosecurity pan for the citrus industry, the review of the orchard biosecurity manual, refinement of the Huanglongbing contingency plan, delivery of an exotic pest incursion simulation exercise, provision of Emergency Plant Pest Response Deed (EPPRD) training, development of an Owner Reimbursement Costs framework, a Citrus Industry Surveillance Strategy (2016), a stakeholder survey and the employment of a Citrus Biosecurity Manager to coordinate biosecurity activity within the citrus industry and led a study tour of allow government and industry representatives to see the impact of Huanglongbing and Asiatic citrus psyllid on the United States citrus industry. This activity has assisted the project in meeting its objectives and resulted in an improvement of the level of biosecurity preparedness of the industry and increased the level of awareness of exotic pest threats and the importance of biosecurity amongst growers, their consultants, and other stakeholders.

This material is aimed at various audiences including decision makers, researchers and growers to ensure that all sections of the citrus industry are aware of the importance of biosecurity. Of note, the project funded a part time Citrus Biosecurity Manager to coordinate biosecurity activity and facilitate the delivery of information from the project to growers and other stakeholders. The Citrus Biosecurity Manager has taken a strong leadership role in relation to training, awareness and surveillance of high priority pests and has established strong networks both nationally and internationally.

The project has been successful in achieving its objectives, however more work is required to build on the momentum of this project. The biosecurity session at the National Issues Forum for Citrus (November 2015) highlighted the significant outcomes from the biosecurity program, and canvassed across the industry for input towards a new biosecurity program, which could expand on the work from this project. The feedback from the existing program was positive, and engagement on the importance of biosecurity in the citrus industry was very strong. It is therefore recommended that additional biosecurity work is carried out by the citrus industry to build on the strong base created by this project.

Keywords

Citrus; biosecurity; preparedness; awareness; Huanglongbing; exotic pests; citrus psyllid; biosecurity manual; biosecurity plan; contingency planning

Introduction

The Australian citrus industry currently enjoys freedom from many pests and diseases that impact production or market access overseas. Maintenance of Australia's plant health status is vital to retain existing trade opportunities, negotiate access to domestic and overseas markets and ensure the future profitability and viability of Australia's citrus industry.

This project was designed to assist the citrus industry to improve its biosecurity planning, biosecurity preparedness and increase the industry's awareness of exotic pest threats. This ensures that the industry is able to better cope with exotic pest incursions and is better informed about the potential risks that could affect the citrus industry.

To achieve these goals a series of biosecurity documents and a biosecurity program has been developed.

Key components of the project included:

- An audit of the current level of biosecurity activity in the citrus industry
- Development of a Citrus Biosecurity Program including the employment of a part time Citrus Biosecurity Manager to coordinate citrus biosecurity activity
- Study tour to the United States to see the impact of Huanglongbing and Asiatic citrus psyllid first hand
- Review of the Industry Biosecurity Plan
- Review of the Orchard Biosecurity Manual
- Provision of Emergency Plant Pest Response Deed (EPPRD) training
- Development of an Owner Reimbursement Costs Framework
- Refinement of the Huanglongbing (HLB) Contingency Plan
- Simulation exercises involving an incursion of an exotic citrus pest
- Development of a Citrus Industry Surveillance Strategy 2016
- Stakeholder Surveys

Methodology

This project utilized a skills based Steering Committee consisting of Plant Health Australia and industry members. The Steering Committee met regularly through face to face and teleconference meetings to discuss specific issues associated with the delivery of the project.

A basic methodology is provided below for each of the major components of the project

Biosecurity Audit

In order to gain an understanding of the existing level of biosecurity activity within the citrus industry a desktop review was undertaken to identify what awareness material, surveillance and other biosecurity activities are currently being undertaken by the citrus industry.

Industry Biosecurity Plan

The review of the citrus biosecurity plan allows the citrus industry to better prepare for, and respond to, incursions of emergency plant pests that could have significant financial impacts on the Australian citrus industry.

The biosecurity plan delivered the following components:

- identification and updating of all exotic pest threats to the citrus industry, including an analysis of the entry, establishment and spread potentials together with the potential economic impact
- identification of risk mitigation activities recommended and currently undertaken at the national, state, industry and individual grower levels
- identification of key areas of investment in biosecurity for the citrus industry
- identification of sources of information for priority plant pests

The biosecurity plan was reviewed in consultation with industry, researchers and state governments. Following a preliminary literature review by Plant Health Australia (PHA) a group of technical experts reviewed the risks associated with each pest and determined the entry, establishment and spread and potential economic impact of each pest. High priority pests were identified and an action plan was agreed and has been largely implemented throughout the span of this program.

Citrus Biosecurity Program and Appointment of a Citrus Biosecurity Manager

A key component of this project has been the establishment of a citrus biosecurity program and the employment of a citrus biosecurity manager. This program was modeled on the successful Grains Farm Biosecurity Program, which PHA has run for several years. The Citrus Biosecurity Program is designed to

provide information to growers and their consultants about farm-level biosecurity. Additionally, the Citrus Biosecurity Manager also provided a coordination role for citrus biosecurity activity with a strong focus on surveillance.

A key activity of note from the program was a study tour, organized by the Citrus Biosecurity Manager, to Huanglongbing affected areas of the United States. The tour included representatives from government and industry groups so that they could see the impact of the pest first hand and therefore better understand its potential impact in Australia.

Significant networks have been established for the citrus industry nationally and internationally through the Citrus Biosecurity Manager.

Emergency Plant Pest Response Deed Training

The National Emergency Plant Pest Training Program, was run by PHA, to provide Citrus Australia, as an Emergency Plant Pest Response Deed (EPPRD) Party, with essential information to fulfil their EPPRD obligations and effectively contribute to emergency responses affecting their industry.

Training on the EPPRD, including the citrus industry's roles and responsibilities as a Party to the agreement, was delivered to the Citrus Australia Board, management, the Citrus Biosecurity Manager and other significant stakeholders. The key content included an overview of the EPPRD, categorisation, Owner Reimbursement Costs, Cost Sharing responsibilities and identification of the key roles that must be filled in the event of an incursion that impacts on the citrus industry.

Refinement/Review of the Huanglongbing Contingency Plan

Prior to the commencement of this project a large contingency plan (over 300 pages long) was developed. Although comprehensive the document was difficult to use. As a result, this project sought to develop an updated HLB contingency plan. The contingency plan provides essential information to inform an Emergency Plant Pest response.

The contingency plan covered the following sections:

- Pest information and background
    - Pest details, including life cycle information
    - Host range
    - Current geographic distribution
    - Symptoms
    - Diagnostic information
    - Risk ratings and impacts
- Pest management
    - Surveys and epidemiological studies, including detection strategies and the collection of samples
    - Control measures available, including biological, physical, host resistance, chemical and cultural controls

- Course of action
    - Destruction strategies
    - Containment strategies
    - Quarantine and movement controls
    - Zoning
    - Decontamination and farm clean-up
    - Surveillance
    - Stakeholder engagement

The Contingency Plan was developed through a desktop literature review and included input from relevant experts where appropriate.

Simulation Exercise

A simulation exercise, called "Exercise Yellow Dragon" was developed to increase the understanding of the required roles and resources, identify areas of improvement, and test an industry's pest incursion response system. The simulation exercise involved the formation of a steering group to decide on details of the hypothetical incursion and PHA staff to facilitate the simulation exercise. A workshop based exercise (which included representatives from government and industry) was held, following the exercise a set of recommendations was developed that identified gaps for industry to consider.

Citrus Industry Surveillance Strategy 2016

Surveillance was identified as a key priority with the primary goal being early detection of high priority pests in the event of an incursion. The following elements of citrus surveillance were to be addressed:

- What pests to survey
- Where are the high risk pathways and therefore the important areas to cover
- What methods of surveillance should be used
- When should surveillance occur
- How frequently does the surveillance need to occur
- Who needs to be involved in surveillance

A range of surveillance activities were piloted to address each of the high risk pathways during the course of the Program and often were undertaken as a shared initiative between industry and government. These activities informed the Strategy.

Stakeholder Surveys

Stakeholder surveys were conducted at the beginning and end of the program as a means of evaluating progress in relation to biosecurity awareness during the program.

Outputs

Biosecurity planning, preparedness, and awareness in the citrus industry was strengthened through this project by the delivery of the following activities:

- Citrus Biosecurity Audit and report – a desktop study to get a snapshot of the citrus industry's structure and biosecurity activity, identify gaps and to inform the rest of the project.

- Appointment of a part time Citrus Biosecurity Manager to facilitate and coordinate biosecurity activity within the citrus industry. The citrus biosecurity manager was also involved in organizing a small study tour to the United States so that relevant stakeholders could learn more about the impact that Huanglongbing is having on the United States citrus industry. The program also provided a mechanism for the dispersal of biosecurity information to growers and their consultants and therefore improved the biosecurity preparedness and awareness of the individual growers and the industry as a whole.

- Development of a First Detector Network. The Network consists of a small group of crop scouts from the main citrus grower regions that have been trained by the Citrus Biosecurity Manager in the identification of the citrus industry's High Priority Pests and how to report suspicious pests. This provides a general surveillance program for the citrus industry and will assist in the early detection of exotic plant pests, and therefore provides the greatest chance of successfully eradicating pests if they are found.

- Review of the Citrus Biosecurity Plan. The biosecurity plan is designed to rank pest threats and assist industry to understand their current level of preparedness and where to focus resources on biosecurity issues. For example, the biosecurity plan informed the pests covered by the factsheets included in the Citrus orchard biosecurity manual.

- Review of the Orchard Biosecurity Manual for the citrus industry. This document is designed to assist growers to become more familiar with biosecurity concepts and to raise awareness of the key exotic pests of the citrus industry.

- Review of the Contingency Plan for Huanglongbing and its vectors. This document provides details on the life cycle, and management of the pest and is designed to be used in a response to a pest incursion of Huanglongbing and/or its psyllid vectors.

- EPPRD training to all relevant sectors and key representatives of the citrus industry. This training assists the citrus industry to better understand its responsibilities under the EPPRD

- Development of a framework for Owner Reimbursement Costs (ORCs). ORCs outline how growers will be reimbursed for losses incurred as a direct result of an approved Response. These reimbursements are designed to ensure there is no disincentive for growers to report exotic pests and diseases and is therefore an important component of the industry's biosecurity activities.

- Delivery of a simulation exercise. "Exercise Yellow Dragon" simulated an incursion of Huanglongbing and its insect vector, Asiatic citrus psyllid to assess the effectiveness of Australia's planned eradication strategies for Huanglongbing and Asiatic citrus psyllid in a scenario where the disease was first detected in an urban setting. This exercise resulted in a report and a series of recommendations.

- The Citrus Industry Surveillance Strategy 2016 was developed and will inform a National Citrus Surveillance Workshop which has as a primary objective to underpin a National Citrus Surveillance Program in the future.
- Stakeholder surveys completed at the start and end of the project. These surveys provided a method of assessing the impact of the project and improvement of the biosecurity preparedness of the industry. The survey indicated that more respondents have engaged in regular monitoring and surveillance and that most growers know about the biosecurity plan with 90% of respondents having a copy of the biosecurity manual. Other citrus industry forums supported a significant improvement in biosecurity awareness and significant motivation from industry to address biosecurity issues.

Outcomes

This project has resulted in three main outcomes.

1. Increased awareness of biosecurity amongst the Australian Citrus Industry.
2. Increased surveillance of high priority pests of the Australian Citrus Industry.
3. Increased preparedness for a biosecurity response

Increased awareness of biosecurity has been achieved by developing an Orchard Biosecurity Manual for citrus growers, training crop scouts in the identification of exotic pests (through an informal program called the First Detector Network), and the employment of a Citrus Biosecurity Manager to assist in delivering biosecurity messages to growers and consultants across Australia's main citrus production areas.

Increased surveillance of high priority pests has been achieved by the Citrus Biosecurity Manager training crop scouts (through the First Detector Network) and by working collaboratively with State and Commonwealth governments to ensure that citrus pests are well covered by state and commonwealth surveillance activities. This work has ensured that the citrus industry has improved its level of surveillance for exotic plant pests. This model has been shared with the vegetable and grains industries as a potential model for engagement of industry in surveillance.

The above activities together with the biosecurity audit, EPPRD training, the review of the Biosecurity Plan, the revision of the Huanglongbing contingency plan, the development of an ORC framework and a surveillance strategy have assisted the industry to increase its level of preparedness for biosecurity threats.

Evaluation and Discussion

This project has been well received by the Australian Citrus Industry and has laid a solid foundation on which the industry can continue to improve its level of biosecurity preparedness. Documents such as the Orchard Biosecurity Manual have helped raise awareness of biosecurity practices and exotic pests with growers, while the Biosecurity Plan, Contingency Plan and Surveillance Strategy assist the industry, state and commonwealth governments plan and prepare for pest incursions, identify where gaps exist and can therefore take steps to fill the identified gaps.

The Contingency Plan for Huanglongbing and its Vectors represents an effort to streamline previous versions in an effort to provide clear direction in a response. Whilst this has been achieved it is important to acknowledge the significance of the more comprehensive version which should always be considered in support as an appendix. The currency of such documents requires ongoing review as new information comes to hand.

Raising awareness of biosecurity and exotic pest threats was one of the main objectives of this project. This has largely been achieved by the development of the Orchard Biosecurity Manual and the employment of the Citrus Biosecurity Manager to provide training to growers and consultants at field walks, forums, and other industry events. The biosecurity session at the National Issues Forum for Citrus (November 2015) showed that the industry's grower base was supportive of the program and understood the importance of biosecurity practices. A vote to increase the biosecurity levy for citrus was further evidence of this support. The stakeholder survey confirmed this improvement in awareness. Ongoing surveys would be recommended now that a firm baseline has been acquired. Practice change in biosecurity does not generally occur instantaneously, and whilst the industry is motivated by some very real and serious threats, an ongoing Citrus Biosecurity Program is required to maintain sufficient momentum.

The project also highlighted that although well prepared in many aspects, particularly in comparison to other plant industries, the Australian citrus industry still faces biosecurity challenges. An important challenge identified by this project was that surveillance could be improved. For example, Huanglongbing and Asian citrus psyllid are well recognized as being the most significant threats to Australian citrus, however surveillance for these pests is not being conducted by state departments of agriculture in all citrus producing states. There are also other high priority citrus pests that were identified in the biosecurity plan but are not being surveyed for at all. This highlights that the industry could benefit from a national citrus surveillance program. The Citrus Industry Surveillance Strategy 2016 appended to this report, will make a significant contribution to the development of a National Strategy to underpin a National Surveillance Program.

Exercise Yellow Dragon simulated a response to an incursion of Huanglongbing and its vector, the Asiatic citrus psyllid, in an urban area. The simulation exercise resulted in a number of recommendations including: issues around response operations, community engagement and documentation. The simulation exercise together with the review of the Huanglongbing contingency plan and the related study tour of the United States has helped to highlight the impact and importance of preparing for Huanglongbing and its psyllid vectors. A strong emphasis on community awareness and engagement is recommended as a high priority for any future program. These activities along with the EPPRD training,

and the development or Owner Reimbursement Cost frameworks have assisted the industry better prepare for exotic pest incursions.

Recommendations

The work completed by this project has helped to put the citrus industry down the path of improving its level of biosecurity preparedness. However, it is important that the significant momentum generated by this program is maintained and that a commitment to ongoing improvement in biosecurity preparedness is achieved through an investment in a future citrus biosecurity program. Regular review of high priority pests and prioritization of implementation activities by a Citrus Biosecurity Implementation Group is recommended.

The Citrus Biosecurity Manager has developed strong networks with industry, government and research both nationally and internationally through this program. This has built biosecurity capacity for the citrus industry and has definitely created support for ongoing biosecurity activity. These networks should be further developed in any future program, ensuring that such networks are captured and flow through for the benefit of the broader citrus industry.

A key gap identified through this project was that although citrus surveillance is occurring in all citrus producing states there is not a consistent program across all states. Therefore, there would be a significant benefit in developing a national citrus surveillance program.

The contingency plan identified several insecticides that have been used to control the Asiatic citrus psyllid overseas. However, before chemical can be used in Australia for the control of any pest's appropriate permits must be obtained by the APVMA. It is therefore recommended that the citrus industry considered seeking emergency or minor use permits for the control of several of the citrus industry's high priority pests, such as the Asiatic citrus psyllid, which is a vector of Huanglongbing. Such permits, when coupled with a contingency plan increase the citrus industry's ability to react to pest threats and should improve the chance of successfully eradicating the pest.

Practice change takes time to occur. Therefore, it is recommended that biosecurity training and awareness activities aimed at growers and their consultants continue to be provided to ensure that basic biosecurity practices become part of the citrus industry's normal business activities. Ongoing surveys are also recommended to evaluate progress.

Awareness amongst, growers and crop scouts has definitely been raised through this program. Efforts in relation to awareness would need to focus on the urban environment and other components of the supply chain in any future program.

Scientific Refereed Publications

No refereed publications have been developed by this project

Intellectual Property/ Commercialisation

No commercial IP generated

Acknowledgements

The commitment and strategic drive from the Citrus Biosecurity Steering Committee (Steve Burdette, Judith Damiani, Andrew Harty, Tim Herrman - Citrus Australia; Rohan Burgess, Alison Saunders and Rod Turner - PHA) and the Citrus Biosecurity Manager (Stuart Pettigrew) requires special mention.

Industry biosecurity champions are acknowledged for their role in raising the profile of citrus biosecurity message.

The First Detector Network are acknowledged for their commitment to industry level surveillance.

The Citrus Biosecurity Program would like to note the significant technical support of Departmental experts, consultants and researchers who have all contributed to a stronger biosecurity capability for the Australian Citrus Industry.

Plant Health Australia would like to thank everyone who contributed to the project through preparing and reviewing documents and training material.

Appendices

The following documents are available from Plant Health Australia on request.

- Citrus Biosecurity Audit
- Citrus Industry Biosecurity Plan
- Orchard Biosecurity Manual (http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Biosecurity-Manual-for-Citrus-Producers.pdf).
- Huanglongbing and Asian Citrus Psyllid Contingency Plan (Reviewed December 2015)
- Huanglongbing Study Tour Report
- Citrus Owner Reimbursement Costs Framework (http://www.planthealthaustralia.com.au/wp-content/uploads/2012/11/Citrus-ORC-Evidence-Framework-Perennial-trees.pdf).
- Biosecurity Manager monthly progress reports
- Citrus Industry Surveillance Strategy 2016
- Citrus Biosecurity Survey

Protecting Australia's Citrus Industry from Biosecurity Threats

Addendum to the Final Report

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The Australian citrus industry currently enjoys freedom from many pests and diseases that impact production overseas. The recent detection and subsequent eradication of Citrus canker (*Xanthomonas citri* subsp. *citri*) from Queensland and recent incursions of Asian citrus psyllid and Huanglongbing in the United States have highlighted the importance and the need for the Australian citrus industry to take steps to ensure it is prepared for, and able to respond effectively to exotic pest incursions. This project was designed with the objective of strengthening industry planning and preparedness in relation to biosecurity and other risks, and to facilitate awareness of exotic pests and diseases.

To achieve these objectives, the project has developed a range of materials. Key outputs from this project include: an audit of the current level of biosecurity activity in the citrus industry, revision of the biosecurity pan for the citrus industry, review of the orchard biosecurity manual, refinement of the Huanglongbing contingency plan, delivery of an exotic pest incursion simulation exercise, provision of Emergency Plant Pest Response Deed (EPPRD) training, development of an Owner Reimbursement Costs framework, a Citrus Industry Surveillance Strategy (2016), a stakeholder survey and the employment of a Citrus Biosecurity Manager to coordinate biosecurity activity within the citrus industry and led a study tour of allow government and industry representatives to see the impact of Huanglongbing and Asiatic citrus psyllid on the United States citrus industry. This activity has assisted the project in meeting its objectives and resulted in an improvement of the level of biosecurity preparedness of the industry and increased the level of awareness of exotic pest threats and the importance of biosecurity amongst growers, their consultants, and other stakeholders.

This material is aimed at various audiences including decision makers, researchers and growers to ensure that all sections of the citrus industry are aware of the importance of biosecurity. Of note, the project funded a part time Citrus Biosecurity Manager to coordinate biosecurity activity and facilitate the delivery of information from the project to growers and other stakeholders. The Citrus Biosecurity Manager has taken a strong leadership role in relation to training, awareness and surveillance of high priority pests and has established strong networks both nationally and internationally.

The project has been successful in achieving its objectives, however more work is required to build on the momentum of this project. The biosecurity session at the National Issues Forum for Citrus (November 2015) highlighted the significant outcomes from the biosecurity program, and canvassed across the industry for input towards a new biosecurity program, which could expand on the work from this project. The feedback from the existing program was positive, and engagement on the importance of biosecurity in the citrus industry was very strong. It is therefore recommended that additional biosecurity work is carried out by the citrus industry to build on the strong base created by this project.

In recognition of this need, the existing project was extended to continue with priority activities until a further project could be developed and funded. In this addendum to the final report we discuss industry surveillance, the establishment and activities of a citrus Biosecurity Implementation Group and communication articles to the citrus industry. Efforts in relation to all aspects of biosecurity must continue to ensure the citrus industry continues to be strong leaders in biosecurity within Australia.

Keywords

Citrus; biosecurity; preparedness; awareness; Huanglongbing; exotic pests; citrus psyllid; biosecurity manual; biosecurity plan; contingency planning

Introduction

The Australian citrus industry currently enjoys freedom from many pests and diseases that impact production or market access overseas. Maintenance of Australia's plant health status is vital to retain existing trade opportunities, negotiate access to domestic and overseas markets and ensure the future profitability and viability of Australia's citrus industry.

This project was designed to assist the citrus industry to improve its biosecurity planning, biosecurity preparedness and increase the industry's awareness of exotic pest threats. This ensures that the industry is able to better cope with exotic pest incursions and is better informed about the potential risks that could affect the citrus industry.

To achieve these goals a series of biosecurity documents and a biosecurity program has been developed.

Key components of the original project included:

- An audit of the current level of biosecurity activity in the citrus industry
- Development of a Citrus Biosecurity Program including the employment of a part time Citrus Biosecurity Manager to coordinate citrus biosecurity activity
- Study tour to the United States to see the impact of Huanglongbing and Asiatic citrus psyllid first hand
- Review of the Industry Biosecurity Plan
- Review of the Orchard Biosecurity Manual
- Provision of Emergency Plant Pest Response Deed (EPPRD) training
- Development of an Owner Reimbursement Costs Framework
- Refinement of the Huanglongbing (HLB) Contingency Plan
- Simulation exercises involving an incursion of an exotic citrus pest
- Development of a Citrus Industry Surveillance Strategy 2016
- Stakeholder Surveys

Following conclusion of this work, it was recommended that additional biosecurity work be carried out by the citrus industry to build on the strong base created by this project. This is an addendum to the final report to include the extension deliverables.

Key components of the extension included:

- Industry surveillance
- Biosecurity Implementation Group establishment and activities

- Biosecurity communication articles

Methodology

This project utilized a skills based Steering Committee consisting of Plant Health Australia and industry members. Across the project extension period the Steering Committee held a teleconference in December and a face to face meeting in March.

A basic methodology is provided below for each of the major components of the extension of the original project.

Industry Surveillance

The coordination of citrus biosecurity activities with a strong focus on surveillance was a key role of the Citrus Biosecurity Manager engaged within the original project. Work undertaken by the Citrus Biosecurity Manager was to provide citrus pest surveillance data into AusPestCheck across the following areas:

- Atherton Tablelands – for 30 properties
- Riverland
- Riverina
- Sunraysia

The Riverland, Riverina and Sunraysia growing regions required surveillance data to be provided once a month, for three months over the Spring/Summer surveillance period.

Biosecurity Implementation Group establishment and activities

As part of a continual improvement of Biosecurity Plans, the citrus industry piloted on the 3rd of March 2017 a Biosecurity Reference Panel (BRP). The BRP will be responsible for the ongoing monitoring of completion of activities identified in the biosecurity implementation table of the Biosecurity Plan (BP). The BRP will also be responsible for review of any updates required to the high priority pest list that may be required between formal reviews of the BP (every 5 years) because of changes to pest pathways, mitigation activities or new knowledge obtained from overseas.

The BRP members delivered the following components:

1. A review of the High Priority Pests (HPPs).
2. Comments and suggestions on the inclusion of future members of the BRP.
3. A review and the prioritization of activities in the newly formed biosecurity implementation table.

The BRP consisted of industry including the Citrus Biosecurity Manager, researchers and PHA representatives.

Biosecurity communication articles

To engage with growers and the general citrus community on biosecurity five communication articles were written for the citrus E newsletter by either the Citrus Biosecurity Manager or PHA. The Citrus Biosecurity Manager also presented at the Citrus Technical Forum in March 2017.

Extension Outputs

Biosecurity planning, preparedness, and awareness in the citrus industry was strengthened through the extension of this project by the delivery of the following activities:

- Further development of citrus surveillance capacity through Citrus Biosecurity Manager and their coordination of the First Detector Network. An example of the surveillance data for the Atherton tablelands submitted into AusPest Check is shown in Figure 1.
- Establishment of a Biosecurity Reference Panel. This group is responsible for the ongoing monitoring of the activities set out in the biosecurity implementation table and will be responsible for the review of the high priority pest list.
- Development of a Huanglongbing (HLB) task force. This was achieved during the Biosecurity Reference Panel and will contain similar membership as the Biosecurity Reference Panel. The HLB task force will meet biannually to priortise and advise action in relation to preparedness and response for the citrus industry's highest priority pest. The HLB taskforce will also revise the HLB contingency plan utilizing a new template and database currently under development by the Victorian Department.
- Development of communication articles reporting on surveillance as part of ongoing industry biosecurity activities. This has informed citrus growers about the various surveillance programs in place and raised awareness of exotic pests. The presentation at the citrus technical forum by the Citrus Biosecurity Manager provided another avenue for communication with growers regarding biosecurity and was well received by the industry.

Figure 1: Huanglongbing Surveillance Data from the Atherton Tablelands A) State map B) Localised distribution

A

B

Outcomes

This project has resulted in three main outcomes.

1. Increased awareness of biosecurity amongst the Australian Citrus Industry.
2. Increased surveillance of high priority pests of the Australian Citrus Industry.
3. Increased preparedness for a biosecurity response

Within the scope of the entire project, increased awareness of biosecurity has been achieved by developing an Orchard Biosecurity Manual for citrus growers, training crop scouts in the identification of exotic pests (through an informal program called the First Detector Network), and the employment of a Citrus Biosecurity Manager to assist in delivering biosecurity messages to growers and consultants across Australia's main citrus production areas. The communication articles delivered in the extension period of this project has furthered biosecurity awareness amongst growers.

Increased surveillance of high priority pests has been achieved by the Citrus Biosecurity Manager training crop scouts (through the First Detector Network) and by working collaboratively with State and Commonwealth governments to ensure that citrus pests are well covered by state and commonwealth surveillance activities. This work has ensured that the citrus industry has improved its level of surveillance for exotic plant pests. This model has been shared with the vegetable and grains industries as a potential model for engagement of industry in surveillance. During the extension period of the project the Atherton and Central Tablelands surveillance data has been submitted to PHA for input into AusPestCheck. A total of 292 and 156 data points were received from the Atherton and Central Tablelands structured surveillance program covering 8 pests across 203 properties and 4 pests across 117 properties respectively. No exotic pests were detected in this surveillance, and importantly effects contributed to improved awareness amongst growers and crop scouts of the significance of key pest threats and the need for ongoing surveillance. The Riverland, Riverina and Sunraysia surveillance data collected as part of the First Detector Network is expected to be submitted by the end of April 2017.

The above activities together with the biosecurity audit, EPPRD training, the review of the Biosecurity Plan, the revision of the Huanglongbing contingency plan and formation of a Huanglongbing taskforce the development of an ORC framework and a surveillance strategy have assisted the industry to increase its level of preparedness for biosecurity threats.

Evaluation and Discussion

This project has laid a solid foundation on which the citrus industry can continue to improve its level of biosecurity preparedness. Documents such as the Orchard Biosecurity Manual have helped raise awareness of biosecurity practices and exotic pests with growers, while the Biosecurity Plan, Contingency Plan and Surveillance Strategy assist the industry, state and commonwealth governments to plan and prepare for pest incursions, identify where gaps exist and can therefore take steps to fill the identified gaps.

The Contingency Plan for Huanglongbing and its vectors represents an effort to streamline previous versions in an effort to provide clear direction in a response. Whilst this has been achieved it is important to acknowledge the significance of the more comprehensive version which should always be considered in support as an appendix. The currency of such documents requires ongoing review as new information comes to hand and the formation of the Huanglongbing taskforce (established in March 2017 during the extension period of this project) will help to meet this requirement.

Raising awareness of biosecurity and exotic pest threats was one of the main objectives of this project. This has largely been achieved by the development of the Orchard Biosecurity Manual and the employment of the Citrus Biosecurity Manager to provide training to growers and consultants at field walks, forums, and other industry events. The biosecurity session at the National Issues Forum for Citrus (November 2015) showed that the industry's grower base was supportive of the program and understood the importance of biosecurity practices. A vote to increase the biosecurity levy for citrus was further evidence of this support. The stakeholder survey confirmed this improvement in awareness. Ongoing surveys would be recommended now that a firm baseline has been acquired. Practice change in biosecurity does not generally occur instantaneously, and whilst the industry is motivated by some very real and serious threats, an ongoing Citrus Biosecurity Program is required to maintain sufficient momentum. During the course of the project extension period a new project proposal has been submitted to HIA for to develop a Citrus Biosecurity Program. In the meantime, the Citrus Biosecurity Manager has, along with PHA, provided biosecurity communication articles for publication in the industry newsletter to help foster a culture of biosecurity awareness.

The project also highlighted that although well prepared in many aspects, particularly in comparison to other plant industries, the Australian citrus industry still faces biosecurity challenges. An important challenge identified by this project was that surveillance could be improved. For example, Huanglongbing and Asian citrus psyllid are well recognized as being the most significant threats to Australian citrus, however surveillance for these pests is not being conducted by state departments of agriculture in all citrus producing states. There are also other high priority citrus pests that were identified in the biosecurity plan but are not being surveyed for at all. This highlights that the industry could benefit from a national citrus surveillance program. The Citrus Industry Surveillance Strategy 2016, will make a significant contribution to the development of a National Strategy to underpin a National Surveillance Program.

Exercise Yellow Dragon simulated a response to an incursion of Huanglongbing and its vector, the Asiatic citrus psyllid, in an urban area. The simulation exercise resulted in a number of recommendations including: issues around response operations, community engagement and documentation. The simulation exercise together with the review of the Huanglongbing contingency plan and the related study tour of the United States has helped to highlight the impact and importance

of preparing for Huanglongbing and its psyllid vectors. A strong emphasis on community awareness and engagement is recommended as a high priority for any future program. These activities along with the EPPRD training, and the development or Owner Reimbursement Cost frameworks have assisted the industry better prepare for exotic pest incursions.

Recommendations

The work completed by this project has helped to put the citrus industry down the path of improving its level of biosecurity preparedness. However, it is important that the significant momentum generated by this program is maintained and that a commitment to ongoing improvement in biosecurity preparedness is achieved through an investment in a future citrus biosecurity program. Regular review of high priority pests and prioritization of implementation activities by a Citrus Biosecurity Implementation Group was recommended in the final report. As part of the extension of the project the first Citrus Biosecurity Implementation Group met in March 2017. Following this successful meeting it is recommended that the Citrus Biosecurity Implementation Group continues to meet on an annual basis to review the High Priority Pests of the Citrus industry and to ensure the responsible parties are delivering their milestones outlined in the biosecurity plan implementation table for the citrus industry.

The Citrus Biosecurity Manager has developed strong networks with industry, government and research both nationally and internationally through this program. This has built biosecurity capacity for the citrus industry and has definitely created support for ongoing biosecurity activity. In the extension period these networks were further developed and surveillance data has been provided. More surveillance data is expected in the future and the surveillance networks should be developed in any future program, ensuring that such networks are captured and flow through for the benefit of the broader citrus industry.

A key gap identified through this project was that although citrus surveillance is occurring in all citrus producing states there is not a consistent program across all states. Therefore, there would be a significant benefit in developing a national citrus surveillance program.

The contingency plan identified several insecticides that have been used to control the Asiatic citrus psyllid overseas. However, before the chemical can be used in Australia for the control of any pest's appropriate permits must be obtained by the APVMA. It is therefore recommended that the citrus industry considered seeking emergency or minor use permits for the control of several of the citrus industry's high priority pests, such as the Asiatic citrus psyllid, which is a vector of Huanglongbing. Such permits, when coupled with a contingency plan increase the citrus industry's ability to react to pest threats and should improve the chance of successfully eradicating the pest.

Practice change takes time to occur. Therefore, it is recommended that biosecurity training and awareness activities aimed at growers and their consultants continue to be provided to ensure that basic biosecurity practices become part of the citrus industry's normal business activities. Multiple communication articles, including a workshop presentation at the Citrus Technical Forum in March 2017, have occurred during the extension period of the project. This communication has been well received by the citrus industry and helps to ensure that good biosecurity practices are integrated in general on-farm activities. Ongoing surveys are also recommended to evaluate progress.

Awareness amongst, growers and crop scouts has definitely been raised through this program and has been further developed during the extension period of the project. Efforts in relation to awareness would need to focus on the urban environment and other components of the supply chain in any future program.

Scientific Refereed Publications

No refereed publications have been developed by this project.

Intellectual Property/Commercialisation

No commercial IP generated.

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Plant Health Australia would like to thank everyone who contributed to the project through preparing and reviewing documents and training material.

Appendices

The following documents are available from Plant Health Australia on request.

- Citrus Biosecurity Audit
- Citrus Industry Biosecurity Plan
- Orchard Biosecurity Manual (http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Biosecurity-Manual-for-Citrus-Producers.pdf).
- Huanglongbing and Asian Citrus Psyllid Contingency Plan (Reviewed December 2015)
- Huanglongbing Study Tour Report
- Citrus Owner Reimbursement Costs Framework (http://www.planthealthaustralia.com.au/wp-content/uploads/2012/11/Citrus-ORC-Evidence-Framework-Perennial-trees.pdf).
- Biosecurity Manager monthly progress reports
- Citrus Industry Surveillance Strategy 2016
- Citrus Biosecurity Survey

The following documents were specifically formed as part of the extension period of this project. They are also available from Plant Health Australia on request.

- Citrus Implementation Plan – developed as new section in the Biosecurity Plan for the Citrus Industry
- Citrus Biosecurity Reference Panel Meeting Minutes
- Multiple communication articles, including a workshop presentation by the Citrus Biosecurity Manager at the Citrus Technical Forum in March 2017.