BIOSECURITY PLAN FOR THE AUSTRALIAN COFFEE INDUSTRY

Version 1.0-2018

By Melanie Bottrill, Victoria Ludowici and Rodney Turner

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Foreword

To ensure its future viability and sustainability, it is vital that the Australian coffee industry minimise the risks posed by exotic pests and respond effectively to plant pest threats. The Biosecurity Plan for the Australian Coffee Industry (v 1.0) is a framework to coordinate biosecurity activities and investment for Australia’s coffee industry. It provides a mechanism for industry, governments and stakeholders to better prepare for and respond to, incursions of pests that could have significant impacts on the coffee industry. It aims to assist producers to evaluate the biosecurity risks within their everyday farming and business activities, formally identify and prioritise exotic plant pests (not currently present in Australia), and focus on future biosecurity challenges.

The Biosecurity Plan was developed in consultation with the Biosecurity Implementation Group (BIG) and the Technical Expert Group (TEG). Both of these groups consist of industry, plant health and biosecurity experts. The BIG and the TEG were coordinated by Plant Health Australia (PHA) and included representatives from the Australian Subtropical Coffee Association (ASTCA), Howe Farming, Peasley Horticultural Services Pty Ltd, Kahawa Estate and Skybury Coffee Pty Ltd, relevant state and territory agriculture agencies and PHA.

The development of Threat Summary Tables, constituting a list of more than 220 exotic plant pests and the potential biosecurity threat that they represent to the Australian coffee industry, was key to the biosecurity planning process. Each pest on that list was given an overall risk rating based on four criteria; entry, establishment and spread potential, and economic impact. In this biosecurity plan, established pests of biosecurity significance for the coffee industry were also included. It is well understood that good biosecurity practice is beneficial for the ongoing management of established pests, as well as for surveillance and early detection of exotic pests.

The Biosecurity Plan for the Australian Coffee Industry also details current mitigation and surveillance activities being undertaken and identifies contingency plans, fact sheets and diagnostic protocols that have been developed for pests relevant to the coffee industry. This enables identification of gaps and prioritises specific actions, as listed in the Biosecurity Implementation Table. The development of this table aims to increase industry’s biosecurity preparedness and response capability by outlining specific areas of action which could be undertaken through a government and industry partnership.

This plan is principally designed for decision makers. It provides the coffee industry and government with a mechanism to identify exotic plant pests as well as to address strengths and weaknesses in relation to the industry’s current biosecurity position. It is envisaged that a formal review of the Biosecurity Plan will be undertaken in five years.

This project was funded from industry revenue which is matched by funds provided by the Australian Government. This report is an addition to AgriFutures Australia’s diverse range of over 2000 research publications and it forms part of our Emerging Industries arena, which aims to facilitate the development of new industries based on plants or plant products that have commercial potential for Australia.

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John Harvey
Managing Director
AgriFutures Australia
About the Author

Plant Health Australia (PHA) is a public company, with members including the Australian Government, all state and territory governments, and 39 plant industry organisations. The company was formed to address high priority plant health issues and to work with all its members to develop an internationally outstanding plant health management system that enhances Australia’s plant health status and the sustainability and profitability of plant industries.

Acknowledgments

The authors wish to acknowledge the assistance of all who were involved in this project, especially those people who were part of the Technical Expert Group and Biosecurity Implementation Group and those who helped review earlier drafts of the document.

Abbreviations

ASTCA     Australian Subtropical Coffee Association
BIG       Biosecurity Implementation Group
BP        Biosecurity Plan
HPP       High Priority Pest
NSW DPI   New South Wales Department of Primary Industries
PHA       Plant Health Australia
TEG       Technical Expert Group
TST       Threat Summary Table
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Executive Summary

What the report is about

The Biosecurity Plan (BP) for the Coffee Industry provides a mechanism for the coffee industry, government and other relevant stakeholders to actively determine pests of highest priority, analyse the risks they pose, minimise the impact if a pest incursion did occur, and put in place practices and procedures that will reduce the chance of pests becoming established.

Ensuring the coffee industry has the capacity to minimise the risks posed by pests and to respond effectively to any pest threats is a vital step for the future sustainability and viability of the industry. Through this pre-emptive planning process, the industry will be better placed to maintain domestic and international trade and reduce the social and economic costs of pest incursions on both growers and the wider community.

Who is the report targeted at?

The BP is a framework to coordinate biosecurity preparedness, risk mitigation, and investment for Australia’s coffee industry. It provides a mechanism for industry, governments, and stakeholders to better prepare for, and respond to, incursions of HPPs that could have significant impacts on the coffee industry. It aims to assist the coffee industry to:

- evaluate the biosecurity risks within their farming and business activities,
- formally identify and prioritise exotic plant pests, and
- focus on future biosecurity challenges.

Where are the relevant industries located in Australia?

Coffee is a relatively small Australian plant industry. The total area planted is approximately 520 ha grown by approximately 155 growers in north-eastern New South Wales and Queensland. Production is approximately 1040 tonnes per year (Foster, 2014).

Background

In global terms, Australian plant industries are fortunate to experience relative freedom from many pests (invertebrates and pathogens) and weeds that can have a negative impact on production or trade. Maintenance of our plant health status is vital to retain existing trade opportunities, negotiate access to new overseas markets and ensure the profitability and viability of our primary production industries, both domestically and internationally. Australia has a strong biosecurity system, however, it cannot provide complete protection for Australia’s industries from exotic pests, and industry involvement in biosecurity activities forms an important component of the shared biosecurity responsibility through active engagement with their producers, governments and the general community.

Development of a BP provides the coffee industry with a list of exotic plant pests and the potential biosecurity threat that they represent. Each pest was given an overall risk rating
based on four criteria; entry, establishment, spread potential and economic impact. Through this process, and further consultation, the highest priority pests were identified and highlighted for future research, surveillance, and industry-wide biosecurity awareness activities.

The plan is a framework to coordinate biosecurity activities and investment for Australia’s coffee industry and to address strengths and weaknesses in relation to industry’s current biosecurity position. It provides a mechanism for industry, governments and stakeholders to better prepare for and respond to, incursions of pests that could have significant impacts on Australia’s coffee industry.

**Aims/objectives**

The project aimed to:

- Identify potential exotic pest threats to the coffee industry and, where information is available; determine the associated risk of entry, establishment, spread and economic impact for each pest.

- Prioritise pest threats to the industry to provide direction for the allocation of resources in biosecurity.

- Identify those pests for which the potential threat is unknown and that require additional research.

- Identify key areas for investment in biosecurity in the coffee industry.

- Establish the risk mitigation activities that are currently being undertaken in the industry and determine the activities that could be implemented in the future to reduce biosecurity threats to production.

- Identify surveillance activities and diagnostic capabilities that are available in Australia for the coffee industry.

- Provide an overview of national biosecurity arrangements in Australia and how the coffee industry is aligned with the Australian biosecurity response framework.

**Methods used**

The BP for the coffee industry was developed as follows:

- Identification of a Technical Expert Group (TEG) and a Biosecurity Implementation Group (BIG) including representatives from the coffee industry, governments and scientific experts.

- Prioritisation of exotic pest threats to the coffee industry.

- Meeting of the BIG to develop a Biosecurity Implementation Table and adapt the information in the BP specifically to the coffee industry.

- Coordination of consultation on drafts of the BP through the BIG. The document was distributed to additional stakeholders as required.
Endorsement of the BP by the industry (through Australian Subtropical Coffee Association) and governments state, territory and Commonwealth governments through Plant Health Committee.

Results/key findings

The development of the BP has provided the coffee industry with a robust framework for future biosecurity activities. More specifically the BP has identified over 220 exotic plant pests and diseases that could impact upon the coffee industry. From these, 12 were considered to be High Priority Pests (HPPs) of the coffee industry.

The Biosecurity Plan also details current mitigation and surveillance activities being undertaken and identifies contingency plans, fact sheets and diagnostic protocols that have been developed for pests relevant to the coffee industry. This enables identification of gaps and prioritises specific actions, as listed in the Biosecurity Implementation Table. The development of this table aims to increase industry’s biosecurity preparedness and response capability by outlining specific areas of action which could be undertaken through a government and industry partnership.

Implications for relevant stakeholders

The BP for the coffee industry provides industry, governments and other relevant stakeholders with the information needed to make informed decisions relating to biosecurity issues affecting the Australian coffee industry. The identification of the major biosecurity threats along with a detailed overview of how the coffee industry is aligned with Australia’s biosecurity system allows the industry and governments to better mitigate, and respond to, HPPs.

Recommendations

The BP provides the coffee industry with a list of exotic plant pests that could negatively impact the Australian coffee industry and includes a list of pests considered to pose the greatest risk to the coffee industry. The BP also provides a 'snap shot' in time of the current state of the industry’s biosecurity preparedness and a blueprint for biosecurity requirements within Australia’s coffee industry through the Biosecurity Implementation table. The identification of existing biosecurity resources and the prioritisation of biosecurity threats provides an opportunity for the industry and governments to focus future biosecurity investment. The recommendations from this document are aimed at the coffee industry as well as relevant government departments and other stakeholders.
Introduction

The Biosecurity Plan for the Coffee Industry was developed in consultation with the TEG and the BIG. These groups consisted of industry, plant health and biosecurity experts. Both the TEG and the BIG were coordinated by PHA and included representatives from PHA, ASTCA, government and scientific experts.

The BP not only details exotic pest threats of Australia’s coffee industry, but also contains information on the current risk mitigation and surveillance activities being undertaken and identifies contingency plans, fact sheets and diagnostic protocols that have been developed for pests relevant to the coffee industry.

The plan is a framework to coordinate biosecurity activities and investment for Australia’s coffee industry and to address strengths and weaknesses in relation to industry’s current biosecurity position. It provides a mechanism for industry, governments and stakeholders to better prepare for and respond to, incursions of pests that could have significant impacts on Australia’s coffee industry.
Objectives

Development of the BP provides a framework for industry biosecurity activities to be implemented at the national level. The coffee BP aligns with other BPs produced by PHA for Australian plant industries.

The specific objectives that have been addressed through the development of the BP include:

- Identification of potential exotic pest threats to the coffee industry and, where information is available, the associated risk of entry, establishment, spread and economic impact for each pest.

- Prioritisation of pest threats to the industry providing direction for the allocation of resources in biosecurity in the coffee industry.

- Identification of pests for which the potential threat is unknown and that require additional research.

- Identification of key areas for investment in biosecurity.

- Identification of risk mitigation activities that are currently being undertaken in the industry and determination of activities that could be implemented to reduce biosecurity threats to production and improve biosecurity preparedness.

- Identification of surveillance activities and diagnostic capabilities currently available in Australia for the coffee industry.

- Providing an understanding of national biosecurity arrangements in Australia and how the coffee industry is aligned with the Australian biosecurity response framework.
Methodology

The Biosecurity Plan for the Coffee Industry (BP) has been developed based on National Industry Biosecurity Guidelines developed by PHA and is consistent with other BPs developed or reviewed recently. Additions or modifications to the generic template were determined through the development process in consultation with Industry and Government.

The Biosecurity Plan for the Coffee Industry covers the following sections:

- Executive Summary
  - Executive summary of the BP
  - Established pests identified of biosecurity significance
  - High Priority Pests (HPPs) identified which pose the greatest risk to the industry
  - Implementation options for the BP, including potential action items regarding biosecurity in the coffee industry

- Introduction
  - Introduction and overview of the BP and any industry specific introductory information

- Threat identification and pest risk assessment:
  - Identification and analysis of exotic plant pest threats relevant to the industry, compiled into Threat Summary Tables (TSTs)

- Risk mitigation and preparedness:
  - Pre-emptive strategies that can be adopted at the national, state/territory, regional and individual producer levels to reduce the risks posed by exotic plant pests
  - On-farm biosecurity activities recommended, including those currently being implemented within the industry, to reduce the biosecurity risk to individual growers and the industry as a whole. Note that while this section outlines on-farm activities, it is not intended to be a Farm Biosecurity Manual.

- Response management:
  - Reference to the Emergency Plant Pest Response Deed and the exotic threats identified within it of relevance to the coffee industry
  - Reference to the overarching framework, PLANTPLAN (the National Emergency Preparedness and Response Plan)
  - The general procedures, organisations and contacts responsible for handling an emergency plant pest incident within the industry
The process of developing this BP involved:

1. Identification of TEG and BIG (Table 1) including representatives from the coffee industry, governments and scientific experts.

2. Development of the TSTs of exotic pest threats to the coffee industry.

3. Meeting of the BIG to develop the Biosecurity Implementation Table and adapt the information in the BP specifically to the coffee industry.

4. Coordination of consultation on drafts of the BP through the BIG. The document was distributed to additional stakeholders as required (Table 2).

5. Endorsement of the BP by the industry (through ASCA) and governments (through Plant Health Committee).

Consultation with the coffee industry, government departments and scientific experts was sought throughout the development process to ensure that all stakeholders had input into the document. While ownership of this document resides with the coffee industry and PHA, all efforts have been made to ensure stakeholders are satisfied with the final outcomes.

Table 1. Members of the Coffee TEG and BIG

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Area of expertise</th>
<th>Member of Technical Expert Group</th>
<th>Member of Biosecurity Implementation Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenny Cobon</td>
<td>QDAF</td>
<td>Nematology</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>André Dreth</td>
<td>University of Queensland</td>
<td>Pathology</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>James Drinnan</td>
<td>QDAF</td>
<td>Agronomy</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Jan Fadelli</td>
<td>President of Australian Subtropical Coffee Association (South Lismore NSW)</td>
<td>Industry</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kathy Grice</td>
<td>QDAF</td>
<td>Plant Pathology</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Graham King</td>
<td>Southern Cross University</td>
<td>Genetics</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ian Newton</td>
<td>QDAF</td>
<td>Entomology</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>David Peasley</td>
<td>Peasley Horticultural Services Pty Ltd (Murwillumbah NSW)</td>
<td>Agronomy</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Peter Trevorrow</td>
<td>QDAF</td>
<td>Plant pathology</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Jos Webber</td>
<td>Kahawa Estate (Tintenbar NSW)</td>
<td>Industry</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alison Saunders</td>
<td>PHA</td>
<td>Biosecurity</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Melanie Bottrill</td>
<td>PHA</td>
<td>Biosecurity</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 2. Scientists and others who contributed information for review of the BP

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Area of expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khoa Dang LE</td>
<td>University of Sydney</td>
<td>Nematology</td>
</tr>
<tr>
<td>Rosalie Daniel</td>
<td>NSW Department of Primary Industries</td>
<td>Plant pathology</td>
</tr>
<tr>
<td>Cherie Gambley</td>
<td>QDAF</td>
<td>Virology</td>
</tr>
<tr>
<td>Christine Horlock</td>
<td>QDAF</td>
<td>Virology</td>
</tr>
<tr>
<td>Dennis Howe</td>
<td>Howe Farming (Walkamin QLD)</td>
<td>Industry</td>
</tr>
<tr>
<td>Ian MacLaughlin</td>
<td>Chairman, Skybury Coffee Pty Ltd (Mareeba QLD)</td>
<td>Industry</td>
</tr>
<tr>
<td>Rebekah Pierce</td>
<td>NSW Department of Primary Industries</td>
<td>Industry</td>
</tr>
<tr>
<td>Ted Winston</td>
<td>Tropical Horticultural Consulting</td>
<td>Horticulture</td>
</tr>
<tr>
<td>Victoria Ludowici</td>
<td>PHA</td>
<td>Biosecurity</td>
</tr>
</tbody>
</table>
Chapters

The biosecurity package developed for the Australian coffee industry focuses on a number of key areas as described below.

High Priority Pests

Over 220 exotic coffee pests have been assessed by the TEG and the highest priority exotic pest threats to the Australian coffee industry were identified and included in the Executive Summary. Established pests that have a significant impact on production and are regionalised, have market access impacts or could be kept off a property through good biosecurity practices have also been identified in the BP.

Implementation Table

The Biosecurity Implementation Table aims to build upon the themes outlined in the Intergovernmental Agreement on Biosecurity and the National Plant Biosecurity Strategy by providing a clear line of sight between the development of this BP and broader plant health policy and legislation.

This table aims to provide the focus and strategic direction for plant biosecurity activities relating to the coffee industry over the next five years (i.e. the life of this BP). The table provides specific recommendations on potential biosecurity activities which both the coffee industry and relevant governments could undertake in partnership. This has been developed in an attempt to successfully fill in gaps which have been identified through this biosecurity planning process.

This table has been developed in the recognition that biosecurity is a shared responsibility between industry and governments, and for this reason, the Biosecurity Implementation Table has been produced to help coordinate industry and government actions and resources in the biosecurity system, with the view of creating an effective and productive industry and government biosecurity partnership. By implementing the specific actions listed in the Biosecurity Implementation Table, it will not only strengthen the coffee biosecurity system, but also the broader plant biosecurity system.

Threat identification, pest risk assessments and categorisation

Guidelines are provided for the identification and categorisation of biosecurity threats through a process of qualitative risk assessment. The primary goal is to coordinate identification of exotic pest threats that could impact on productivity, sustainability and marketability and to assess their potential impacts. This plan strengthens risk assessment work already being done both interstate and overseas. Key coffee biosecurity threats are detailed in threat summary tables, along with the High Priority Pest list (the top ranked threats to the coffee industry, see Table 3).

Risk mitigation and preparedness

This section provides a summary of activities to mitigate the impact of pest threats on the Australian coffee industry, along with a set of guidelines for managing risk at all operational levels. Many pre-emptive practices can be adopted by plant industries and government agencies to reduce risks. These include:
- surveillance, awareness and training activities,
- exclusion activities,
- propagation of high health status planting materials,
- destruction of crop residues,
- control of vectors,
- control of alternative hosts and weeds,
- procedures for transporting produce,
- use of warning and information signs,
- use of dedicated equipment when working in high risk areas, or appropriate disinfection protocols,
- restricting the use of high risk vehicles during high risk times,
- reporting suspect pests to appropriate authorities,
- including farm biosecurity in Industry Best Management Practice and Quality Assurance schemes.

Response management

PHA has coordinated the development of PLANTPLAN, a generic emergency response plan for Australia’s plant industries. PLANTPLAN details the procedures required and the organisations responsible in the event of an incursion of a HPP. Pest-specific contingency plans may be developed as a result of the pest threats identified in this plan.

Review processes

With the support of the Biosecurity Reference Panel and PHA this plan will be reviewed on a 5-year basis. The review process will ensure:

- Implementation Table and High Priority Pests are updated to reflect current knowledge
- pest risk assessments are current
- changes to biosecurity processes and legislation are documented
- contact details and the reference to available resources is accurate
Results

The Biosecurity Plan for the Coffee Industry was developed following research conducted by Plant Health Australia together with extensive consultation with personnel from both industry and government. The BP is currently with PHC for government endorsement. The BP will be launched with a media release.

The two key outputs of the biosecurity planning process were the development a high priority pest (HPP) list for Australia’s coffee industry (Table 3) and the development of a biosecurity implementation table (Table 4).

The HPP list identifies the highest risk pests of Australia’s coffee industry, allowing industry to prioritise its biosecurity preparedness activities.

The biosecurity implementation table (Table 4) is the fundamental planning document that will serve to guide the industry and government in delivering its biosecurity priorities. This table aims to provide the focus and strategic direction for plant biosecurity activities relating to Australia’s coffee industry over the next five years.
Table 3. Coffee industry high priority plant pest threat list, ordered by overall risk.

Tier 1 includes the highest priority pests affecting the coffee industry, Tier 2 includes coffee specific pests and Tier 3 includes pests that affect multiple industries (including coffee). Note that risk ratings for economic impact are based on the impact of the pest on the coffee industry, whereas other risk ratings are based on assessment across all potential hosts.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Host(s)</th>
<th>Affected plant part</th>
<th>Dispersal</th>
<th>Geographic distribution</th>
<th>Entry potential</th>
<th>Establishment potential</th>
<th>Spread potential</th>
<th>Economic impact</th>
<th>Overall risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TIER 1 HIGHEST PRIORITY PESTS</strong></td>
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<tr>
<td>Hypothenemus hampei</td>
<td>Coffee berry borer</td>
<td>Coffee, maize, pigeon pea, Minor hosts- Cotton, pea, lima bean, peanut, Acacia</td>
<td>Fruit, seeds</td>
<td>Infested plant material (including seed), machinery and clothing</td>
<td>Asia, Africa, North, central and South America, Europe, Oceania, Papua New Guinea</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>EXTREME</td>
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<tr>
<td>Hemileia vastatrix</td>
<td>Coffee leaf rust</td>
<td>Coffee</td>
<td>Fruit, leaves, stems</td>
<td>Spores spread by water, wind, planting material, coffee bags and clothing. Not normally seedborne</td>
<td>Asia, Africa, South America, North America, Central America, Oceania</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>EXTREME</td>
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<tr>
<td><strong>TIER 2 PESTS SPECIFIC TO COFFEE</strong></td>
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<tr>
<td>Colletotrichum kahawae subsp. kahawae</td>
<td>Coffee berry disease</td>
<td>Coffee</td>
<td>Flowers, leaves, berries</td>
<td>Transmitted by infected plant material</td>
<td>Africa</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
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<td><strong>TIER 3 MULTIPLE HOST PESTS</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fusarium xylarioides</td>
<td>Coffee wilt disease</td>
<td>Cotton, coffee, plantain and soybean</td>
<td>Whole plant</td>
<td>Infected plant material, Soilborne spores</td>
<td>Africa</td>
<td>LOW</td>
<td>HIGH</td>
<td>HIGH</td>
<td>EXTREME</td>
<td></td>
</tr>
<tr>
<td>Ceratocystis fimbriata sensu lato (coffee infecting strains)</td>
<td>Ceratocystis blight</td>
<td>A wide variety of annual and perennial plants including are Eucalyptus spp., Acacia spp., mango and coffee</td>
<td>Whole plant</td>
<td>Propagative materials, especially cuttings, are a likely source of introduction to an area. Soil, sand, gravel etc., machinery, containers and packaging</td>
<td>Asia, Africa, South America, North America, Central America, Europe, Oceania</td>
<td>LOW</td>
<td>HIGH</td>
<td>HIGH</td>
<td>EXTREME</td>
<td></td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>Host(s)</td>
<td>Affected plant part</td>
<td>Dispersal</td>
<td>Geographic distribution</td>
<td>Entry potential</td>
<td>Establishment potential</td>
<td>Spread potential</td>
<td>Economic impact</td>
<td>Overall risk</td>
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<tr>
<td><strong>Xylella fastidiosa</strong> (including X.f. subsp. fastidiosa and X.f. subsp. pauca)</td>
<td>Coffee leaf scorch, Pierce’s disease of grapevine</td>
<td>Coffee, grapevine, pear, almond, peach, plum, elm, sycamore, mulberry, oak, periwinkle, red maple, citrus, blueberry, avocado</td>
<td>Whole plant</td>
<td>Vectored by leafhoppers including Homalodisca vitripennis (which could also be carried internationally on plant material), seed transmission (only reported in citrus)</td>
<td>Present in Asia, North America, Central America and South America and Europe</td>
<td>LOW</td>
<td>HIGH</td>
<td>HIGH</td>
<td>EXTREME</td>
<td>HIGH</td>
</tr>
<tr>
<td><strong>Pseudococcus cryptus</strong> (Syn. Pseudococcus citriculus)</td>
<td>Citrus mealybug, citriculus mealybug, cryptic mealybug</td>
<td>Polyphagous including mango, <em>Citrus</em> spp., lychee, grapevine, <em>Amorphophallus</em> spp., coconut, coffee</td>
<td>Fruit, leaves, stems</td>
<td>Assisted movement (people, equipment) potentially plays a major role in movement over long distances</td>
<td>Asia and South America</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td><strong>Rastrococcus spinosus</strong></td>
<td>Mango mealybug</td>
<td><em>Citrus</em> spp., mango, coffee, cocoa</td>
<td>Leaves, stems, flowers, fruit</td>
<td>Assisted movement (people, equipment) potentially plays a major role in movement over long distances</td>
<td>Asia</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td><strong>Paracoccus marginatus</strong></td>
<td>Papaya mealybug</td>
<td>Polyphagous including <em>Citrus</em> spp., papaya, avocado, mango, cherry, pineapple, pomegranate, hibiscus, cotton, tomato, eggplant, capsicum, bean, pea, sweet potato, coffee</td>
<td>Leaves, stems, fruit</td>
<td>Infested plant material and soil. Assisted movement (people/equipment) potentially plays a major role in movement over long distances</td>
<td>Africa, Asia, Central America and Caribbean, North America, South America, Oceania</td>
<td>MEDIUM-HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td><strong>Oligonychus ilicis</strong></td>
<td>Southern red mite</td>
<td>Azalea, camellia, holly, boxwood, eucalyptus, oak, walnut, camphor laurel, rice, quince, pear, cotoneaster, loquat, strawberry, pear, coffee and rhododendron</td>
<td>Foliage</td>
<td>Infested plant material and soil</td>
<td>East Asia, North and South America and Europe</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>Host(s)</td>
<td>Affected plant part</td>
<td>Dispersal</td>
<td>Geographic distribution</td>
<td>Entry potential</td>
<td>Establishment potential</td>
<td>Spread potential</td>
<td>Economic impact</td>
<td>Overall risk</td>
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</tr>
<tr>
<td><em>Eutetranychus banksi</em></td>
<td>Texas citrus mite</td>
<td>Pest of a wide variety of crops, native and ornamental plants (33 different plant families). Includes coffee, almonds, citrus, grapes, pawpaw, figs, cotton, peanut, date palm</td>
<td>Leaves, fruit, whole plant</td>
<td>Infested plant material, machinery and wind dispersal</td>
<td>North, Central and South America, Middle East, Southern Europe</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td><em>Bactrocera dorsalis</em> (Syn. <em>B. invadens</em>, <em>B. papayae</em>, <em>B. philippinensis</em>)</td>
<td>Oriental fruit fly</td>
<td>Polyphagous -150 kinds of fruit and vegetables, including apricot, avocado, banana, citrus, coffee, fig, guava, loquat, mango, rose apple, papaya, passionfruit, peach, pear, persimmon, pineapple, Surinam cherry and tomato</td>
<td>Fruit</td>
<td>Numerous pathways e.g. infested plant material, adults are capable of flight</td>
<td>Africa, Asia and Oceania</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>
Table 4. The Biosecurity Implementation Table for the Australian Coffee Industry (2017-2022)

<table>
<thead>
<tr>
<th>Biosecurity theme</th>
<th>Action</th>
<th>Responsible party</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity and capability (aligns with Strategy 4 of NPBS, Schedule 6 of IGAB)</strong></td>
<td>1. Establish a coffee biosecurity reference panel (including representatives from both the subtropical and tropical industry) to help coordinate industry’s future biosecurity activities and to review Biosecurity Plan implementation plan annually.</td>
<td>Coffee Industry, PHA</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>2. Establish a national body for the Australian coffee industry that includes both the tropical and subtropical sector</td>
<td>Coffee Industry</td>
<td>2017-2018</td>
</tr>
<tr>
<td></td>
<td>3. Consider joining Plant Health Australia</td>
<td>Coffee Industry, PHA</td>
<td>2017-2018</td>
</tr>
<tr>
<td></td>
<td>4. Consider signing up to the Emergency Plant Pest Response Deed, acknowledging the need to develop a peak industry body.</td>
<td>Coffee Industry, PHA</td>
<td>TBA</td>
</tr>
<tr>
<td><strong>Plant biosecurity education and awareness (aligns with Strategy 7 of NPBS, Schedule 6 of IGAB)</strong></td>
<td>1. Promote best on-farm biosecurity practice, such as hygiene principles and the need to report anything unusual.</td>
<td>Coffee Industry</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>2. Consider on-farm biosecurity planning workshops and the development of an on-farm biosecurity chapter in the <em>Australian subtropical coffee grower’s manual</em>.</td>
<td>Coffee Industry, PHA</td>
<td>2018</td>
</tr>
<tr>
<td></td>
<td>3. Develop coffee specific awareness material, such as factsheets, for high priority pests such as: - Citrus mealybug (<em>Pseudococcus cryptus</em>) - Mango mealybug (<em>Rastrococcus spinosus</em>) - Coffee berry borer (<em>Hypothenemus hampei</em>) - Coffee wilt disease (<em>Fusarium xylarioides</em>)</td>
<td>Coffee Industry, PHA</td>
<td>End 2017</td>
</tr>
<tr>
<td></td>
<td>4. Raise awareness of existing factsheets for Xylella(^1), papaya mealybug(^2) and Oriental fruit fly(^3)</td>
<td>Coffee Industry</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>5. Improve awareness of reporting pests</td>
<td>Coffee Industry, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>6. Develop awareness materials for other parts of the coffee supply chain e.g. roasters, tourism operators and importers with a particular focus on the biosecurity risks associated with importing green beans.</td>
<td>Coffee Industry, PHA</td>
<td>2018</td>
</tr>
<tr>
<td></td>
<td>7. Include a biosecurity module on the Australian Subtropical Coffee Association website on plant biosecurity (including links to existing coffee HPP factsheets and the farm biosecurity website).</td>
<td>Coffee Industry, PHA</td>
<td>2018-2019</td>
</tr>
</tbody>
</table>


8. The Department of Agriculture and Water Resources (DAWR) and Horticulture Innovation Australia Limited (HIAL) are planning the development of communication materials for Xylella. Industry to disseminate these materials to growers as they are developed.


<table>
<thead>
<tr>
<th>Preparedness and Response (aligns with Strategy 3 of NPBS, Schedule 7 of IGAB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop pre-emptive pesticide permits to allow rapid control of HPPs in the event of a pest incursion. Preliminary analysis suggests Oriental fruit fly, Passion vine mite, Texas citrus mite, Southern red mite, Coffee berry borer, Papaya mealybug, Citrus mealybug, Mango mealybug, Coffee wilt and Coffee leaf rust are managed using chemicals overseas and emergency permits may be able to be developed for the control of these pests in the event of a pest incursion.</td>
</tr>
<tr>
<td>Coffee Industry, PHA, APVMA (there may be opportunities to collaborate with other industries, but this would be achieved through consultation with APVMA)</td>
</tr>
<tr>
<td>2018-2019</td>
</tr>
</tbody>
</table>

2. Develop a grower register to allow for contact of industry members in the event of a pest incursion.

3. Engage in planned Xylella simulation exercise as opportunity arises.

4. Develop a response management plan to deal with industry level response requirements (nursery suppliers, response team etc.).

5. Review and disseminate existing Xylella and Papaya mealybug contingency plans.

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<table>
<thead>
<tr>
<th>Biosecurity theme (aligns with Strategy 2 of NPBS, Schedule 4 of IGAB)</th>
<th>Action</th>
<th>Responsible party</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surveillance</strong></td>
<td>1. Raising awareness of HPPs is the first initial and important step in assisting industry to monitor their plantation for both their established pests and exotic pests. Important to encourage/facilitate recording of monitoring data on-farm.</td>
<td>Coffee Industry, PHA</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>2. To refer HPP list to Northern Australia Quarantine Strategy (NAQS) and Subcommittee on National Plant Health Surveillance (SNPHS) for feedback on potential for national approaches to surveillance and any knowledge of interceptions of these pests.</td>
<td>Coffee Industry, SNPHS, NAQS, PHA</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>3. Reference panel to consider surveillance needs annually in light of SNPHS feedback.</td>
<td>Coffee Biosecurity Reference Panel, SNPHS, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>4. Provide surveillance protocols currently used for:</td>
<td>Coffee Biosecurity Reference Panel, NAQS, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>- Coffee leaf rust (Hevastatrix)</td>
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<td></td>
<td>- Coffee berry borer (Hypothenemus hampei)</td>
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<td></td>
<td>- Coffee berry disease (Colletotrichum kahawae subsp. kahawae (Syn. Colletotrichum coffeae)</td>
<td></td>
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</tr>
<tr>
<td><strong>Diagnostics</strong> (aligns with Strategy 5 of NPBS, Schedule 4 of IGAB)</td>
<td>1. To refer HPP list to Sub-committee on Plant Health Diagnostics (SPHD) for feedback on potential for national approaches to diagnostics.</td>
<td>Coffee Industry, SPHD</td>
<td>2017</td>
</tr>
<tr>
<td></td>
<td>- Coffee wilt (Fusarium xylarioides)</td>
<td>Refer to potential collaborative partners from HPP list</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Coffee leaf rust (Hemileia vastatrix)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Texas citrus mite (Eutetranychus banksii)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Southern red mite (Oligonychus ilicis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Papaya mealybug (Paracoccus marginatus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Citrus mealybug (Pseudococcus cryptus)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Mango mealybug (Rastrococcus spinosus)</td>
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<td></td>
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<tr>
<td></td>
<td>- Coffee berry borer (Hypothenemus hampei)</td>
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<tr>
<td></td>
<td>- Ceratocystis blight (Ceratocystis fimbriata)</td>
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</tr>
<tr>
<td></td>
<td>- Coffee berry disease (Colletotrichum kahawae subsp. kahawae (Syn. Colletotrichum coffeae)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Contribute to the review of the Xylella diagnostic protocol</td>
<td>Coffee Industry, DEDJTR, SPHD</td>
<td>TBA</td>
</tr>
<tr>
<td><strong>Established pests and weeds</strong> (aligns with Strategy 6 of NPBS, Schedule 5 of IGAB)</td>
<td>1. Raise industry awareness of pests and weeds of biosecurity significance, and demonstrate how best biosecurity practices have direct relevance to day to day operations for pests already within Australia</td>
<td>Coffee Industry, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td>Biosecurity theme</td>
<td>Action</td>
<td>Responsible party</td>
<td>Due date</td>
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<tr>
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<tr>
<td>Biosecurity Research and Development Extension (RD&amp;E) (aligns with Strategy 8 of NPBS, Schedule 8 of IGAB)</td>
<td>1. Prioritise RD&amp;E in the above sections and within this section of this table annually and ensure that AgriFutures, NFFC, HIA, Plant Biosecurity RDE Implementation Committee are made aware of these priorities.</td>
<td>Coffee Biosecurity Reference Panel, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>2. Keep abreast of and review international coffee pest and disease research, particularly in relation to resistant varieties and diagnostics.</td>
<td>Coffee Biosecurity Reference Panel, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>3. Explore opportunities for PhD research projects into resistant varieties and diagnostics.</td>
<td>Coffee Biosecurity Reference Panel, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>4. Support initiatives for regional biosecurity officers to provide biosecurity education and awareness and surveillance functions.</td>
<td>Coffee Industry</td>
<td>2017-2021</td>
</tr>
<tr>
<td>Legislative and regulatory issues of importance (aligns with Strategy 1 of NPBS)</td>
<td>1. Keep industry up to date with changes in biosecurity legislation, particularly as it relates to individual responsibility</td>
<td>Coffee Industry, State and Commonwealth Government, PHA</td>
<td>2017-2021</td>
</tr>
<tr>
<td></td>
<td>2. Industry to meet with DAWR to discuss biosecurity risks associated with the import of green beans.</td>
<td>Coffee Industry, DAWR, PHA</td>
<td>2017</td>
</tr>
</tbody>
</table>
Implications

In delivering this project, the Australian coffee industry has an improved understanding of its exotic pest threats, and have a clear path forward in improving biosecurity preparedness.

Developing a positive biosecurity culture within an industry is an ongoing commitment for all agricultural industries and it is really encouraging to see the Australian Subtropical Coffee Association demonstrate such leadership. This plan demonstrates that commitment from industry and is a key outcome from this project.
Recommendations

The development of the coffee BP provides a blueprint for biosecurity requirements within the industry. The identification of existing biosecurity resources and the prioritisation of biosecurity threats provides an opportunity for the industry and governments to focus future biosecurity investment. The BP process also highlights where potential gaps in biosecurity capacity and capability can be improved. Recommendations from this project that the Australian coffee industry may wish to consider include:

- establish a national body for the Australian coffee industry that includes both the tropical and subtropical sector
- promote best on-farm biosecurity practice, such as hygiene principles and the need to report any suspected exotic plant pests
- improve awareness of reporting pests and develop awareness materials for other parts of the coffee supply chain e.g. roasters, tourism operators and importers with a particular focus on the biosecurity risks associated with importing green beans
- develop pre-emptive pesticide permits to allow rapid control of HPPs in the event of a pest incursion
- work with Subcommittee on Plant Health Diagnostic Standards to develop National Diagnostic Protocols for HPPs
- keep industry up to date with changes in biosecurity legislation
- industry to meet with DAWR to discuss biosecurity risks associated with the import of green coffee beans
References

Biosecurity Plan for the Australian Coffee Industry

By Melanie Bottrill, Victoria Ludowici and Rodney Turner
April 2018

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