Biosecurity Plan
for the Summerfruit Industry

A shared responsibility between government and industry

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Plant Health AUSTRALIA

Hort Innovation
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SUMMERFRUIT FUND

Summerfruit AUSTRALIA

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Endorsement

The *Biosecurity Plan for the Summerfruit Industry* (Version 2.0) was formally endorsed by the summerfruit industry (through Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia) in April 2019, and all state and territory governments (through the Plant Health Committee) in September 2019. The Australian Government endorses the document without prejudice for the purposes of industry's planning needs and meeting the Department's obligations under clause 13 of the EPPRD. In providing this endorsement the Department notes page 62 of the Plan which states: "This Document considers all potential pathways by which a pest might enter Australia, including natural and assisted spread (including smuggling). This is a broader view of potential risk than the IRA conducted by the Department of Agriculture which focus only on specific regulated import pathways."

Reporting suspect pests

Any unusual plant pest should be reported immediately to the relevant state/territory agriculture department through the Exotic Plant Pest Hotline (1800 084 881). Early reporting enhances the chance of effective control and eradication.

Table of contents

Figures

Tables

List of acronyms

ACPPO	Australian Chief Plant Protection Office
APVMA	Australian Pesticides and Veterinary Medicines Authority
AS/NZS	Australian Standard/New Zealand Standard
BICON	Australian Biosecurity Import Conditions Database
BIG	Biosecurity Implementation Group
BP	Biosecurity Plan
BOLT	Biosecurity On-Line Training
CABI	Centre for Agriculture and Bioscience International
CFICA	Canned Fruits Industry Council of Australia
CCEPP	Consultative Committee on Emergency Plant Pests
CPHM	State Chief Plant Health Manager
DA	Department of Agriculture
DAF Qld	Department of Agriculture and Fisheries, Queensland
DPI NSW	Department of Primary Industries, New South Wales
DJPR	Department of Jobs, Precincts and Regions, Victoria
DPIR NT	Department of Primary Industry and Resources, Northern Territory
DPIPWE	Department of Primary Industries, Parks, Water and Environment, Tasmania
DPIRD	Department of Primary Industries and Regional Development, WA
EPP	Emergency Plant Pest
EPPO	European and Mediterranean Plant Protection Organization
EPPRD	Emergency Plant Pest Response Deed
FAO	Food and Agriculture Organization of the United Nations
HACCP	Hazard Analysis Critical Control Point
HPP	High Priority Pest
ICA	Interstate Certification Assurance
IGAB	Intergovernmental Agreement on Biosecurity
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
IRA	Import Risk Analysis
ISPM	International Standards for Phytosanitary Measures
MICoR	Manual of Importing Country Requirements
NAQS	Northern Australian Quarantine Strategy
NDP	National Diagnostic Protocol
NGIA	Nursery and Garden Industry Australia
NMG	National Management Group
NPBDN	National Plant Biosecurity Diagnostic Network
NPBRDE IC	National Plant Biosecurity Research, Development and Extension Strategy. Implementation Committee

NPBS	National Plant Biosecurity Strategy
NSW	New South Wales
NT	Northern Territory
ORC	Owner Reimbursement Costs
PaDIL	Pest and Disease Image Library
PHA	Plant Health Australia
PHC	Plant Health Committee
PIC	Property Identification Code
PIRSA	Primary Industries and Regions South Australia
QA	Quality Assurance
QLD	Queensland
RDC	Research and Development Corporation
RD&E	Research, Development and Extension
SA	South Australia
SAL	Summerfruit Australia Limited
SARDI	South Australian Research and Development Institute
SDQMA	Sub-Committee for Domestic Quarantine and Market Access
SNPHS	Sub-Committee for Plant Health Surveillance
SPHD	Subcommittee on Plant Health Diagnostic
SPS	Sanitary and Phytosanitary
TEG	Technical Expert Group
TST	Threat Summary Table
Vic	Victoria
WA	Western Australia
WA DPIRD	Western Australia Department of Primary Industries and Regional Development
WTO	World Trade Organization

Definitions

The definition of a plant pest used in this document are insects, mites, snails, nematodes or pathogens (diseases) that have the potential to adversely affect food, fibre, ornamental crops, bees and stored products, as well as environmental flora and fauna. Exotic pests are those not currently present in Australia. Endemic pests are those established within Australia.

EXECUTIVE SUMMARY

Executive Summary

To ensure its future viability and sustainability, it is important that the Australian summerfruit industry (including the canned fruit industry), represented by Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia as the peak industry bodies, minimises the risks posed by exotic pests and responds effectively to plant pest threats. This plan is a framework to coordinate biosecurity activities and investment for Australia's summerfruit 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 summerfruit industry. It identifies and prioritises exotic plant pests (not currently present in Australia) and established pests of biosecurity concern and focus on future biosecurity challenges.

The Biosecurity Plan for the Summerfruit Industry was developed in consultation with the Technical Expert Group (TEG) and Biosecurity Implementation Group (BIG), which consisted of plant health and biosecurity experts and industry representatives. These groups were coordinated by Plant Health Australia (PHA) and included representatives from Summerfruit Australia Limited, the Canned Fruits Industry Council of Australia, relevant state and territory agriculture agencies and PHA.

The development of Threat Summary Tables (TSTs), constituting a list of 260 exotic plant pests and the potential biosecurity threat that they represent to the Australian summerfruit industry was key to the industry biosecurity planning process. Each pest on the list was given an overall risk rating based on four criteria; entry, establishment, spread potential, and economic impact. In this biosecurity plan, established pests of biosecurity significance for the summerfruit industry were also identified (Table 2) as good biosecurity practice is beneficial for the ongoing management and surveillance for these pests.

The Biosecurity Plan for the Summerfruit 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 summerfruit industry (Table 5). This enables identification of gaps and prioritises specific actions, as listed in the Biosecurity Implementation Table (Table 4). The development of this table will increase the summerfruit industry's biosecurity preparedness and response capability by outlining specific areas of action which could be undertaken through a government and industry partnership.

This biosecurity plan is principally designed for decision makers. It provides the summerfruit industry and government with a mechanism to identify exotic plant pests as well as to address the strengths and weaknesses in relation to the summerfruit industry's current biosecurity

position. It is envisaged that annual reviews of this Biosecurity Plan (BP) will be undertaken with another formal review conducted in 5 years.

The biosecurity plan is a document outlining the commitment to the partnership between the summerfruit industry and government to improve biosecurity for the summerfruit industry.

SIGNIFICANT BIOSECURITY THREATS

Document overview

Biosecurity for the Australian summerfruit industry focuses on five key areas to identify the components to be implemented through the life of the biosecurity plan 2019-2022. These five areas are outlined in the sections below.

High priority exotic pests, established pests and weeds of biosecurity significance

A key outcome of this biosecurity plan is the identification of the exotic high priority pests, and established pests and weeds of biosecurity significance for the Australian summerfruit industry (Page 15). This section includes:

- the High Priority Pests (HPPs), are the most significant exotic threats affecting the summerfruit industry as identified through a prioritisation process.
- the established pests of biosecurity significance, which have been identified in consultation with industry
- the established weeds of biosecurity significance, as identified by industry and government.

The exotic HPP list, established pests and weeds of biosecurity significance will allow industry and government to better prioritise preparedness activities and will assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers, development of surveillance programs, diagnostic protocols as well as development of pest-specific mitigation activity.

Implementing biosecurity for the Australian Summerfruit Industry 2019-2022

This section (Page 32) includes the biosecurity implementation plan and a gap analysis of the current level of preparedness for HPPs of the summerfruit industry. The Biosecurity Implementation Group (BIG), comprised of both industry and government representatives, developed the implementation plan that sets out shared biosecurity goals and objectives over the next five years. It is intended that the biosecurity implementation plan is revisited by the Biosecurity Reference Panel regularly over the next five years to maintain its relevance.

Threat identification and pest risk assessments

Guidelines are provided for the identification and ranking of biosecurity threats through a process of qualitative risk assessment. The primary goal is to coordinate identification of exotic

pest threats that could impact productivity, or marketability. This plan strengthens risk assessment work already being done both interstate and overseas. All exotic summerfruit biosecurity threats considered in the biosecurity plan are detailed in threat summary tables (Appendix 2: Threat Summary Tables). From the prioritisation process undertaken in the TST, pests with an overall high rating were identified as a HPP (Table 1). Established pests and weeds of biosecurity significance are also listed.

Risk mitigation and preparedness

This section provides a summary of activities to mitigate the impact of pest threats on the Australian summerfruit 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. The major themes covered include:

- Barrier quarantine
- Surveillance
- Training
- Awareness
- Farm biosecurity
- Reporting of suspect pests

A summary of pest-specific information and preparedness documents, such as fact sheets, contingency plans and diagnostic protocols are also described to outline activities industry has undertaken to prepare for an exotic pest incursion. Information for industry on how to align preparedness activities with R,D&E, such as researching IPM strategies, resistance breeding and chemical control is also provided.

Response management

This section provides a summary of the processes in place to respond to emergency plant pest (EPP)[1] incursions that would affect the Australian summerfruit industry. Areas covered in this section include the Emergency Plant Pest Response Deed (EPPRD), PLANTPLAN (outlines the generic approach to response management under the EPPRD), categorisation of pests under the EPPRD and industry specific response procedures and industry communication.

[1] Refer to the PHA website for details **http://www.planthealthaustralia.com.au/biosecurity/emergency-plant-pests/**

Pests and Weeds of Biosecurity Significance Overview

A key component of this biosecurity plan is to identify the exotic and established pests and weeds of biosecurity significance to the Australian summerfruit industry. This section provides information on the High Priority Pest list, the established pests of biosecurity significance and the established weeds of biosecurity significance to the summerfruit industry. These pest lists provide the Australian summerfruit industry, governments and other stakeholders with the information needed to prioritise resources for biosecurity risk management.

Summerfruit industry high priority exotic pests

Table 1 provides an overview of the top ranked threats to the summerfruit industry for invertebrates, and pathogens and nematodes respectively. Further details on each pest along with the basis for the likelihood ratings are provided in the threat summary tables (Appendix 2: Threat Summary Tables). Assessments may change given more detailed research, and the priority list will be formally reviewed along with the Biosecurity Plan on an annual basis through the biosecurity reference panel. An explanation of the method used for calculating the overall risk can be found on the PHA website[2].

Table 1. *Summerfruit industry high priority pest threat list.*

Common name (scientific name)	Host(s)	Affected plant part	Means of movement & dispersal	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
INVERTEBRATES								
DIPTERA (Flies and midges)								
Mexican fruit fly (*Anastrepha ludens*)	Wide host range including cashew nut, citrus, *Coffea arabica*, apple mango, avocado, passionfruit, avocado, peach and pear	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil	MEDIUM	HIGH	HIGH	HIGH	**HIGH**

[2] Available from **www.planthealthaustralia.com.au/biosecurity/risk-mitigation**

Common name (scientific name)	Host(s)	Affected plant part	Means of movement & dispersal	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Sapodilla fruit fly, Sapote fruit fly (*Anastrepha serpentina*)	Wide host range including sapodilla, citrus, peach, apple, passionfruit, cherry, mango and avocado	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil.	MEDIUM	HIGH	HIGH	HIGH	**HIGH**
Guava fruit fly (*Anastrepha striata*)	Wide host range including passionfruit guava, mango, cassava, peach and citrus	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil	MEDIUM	HIGH	HIGH	HIGH	**HIGH**
Oriental fruit fly, Philippine fruit fly, Invasive fruit fly, Asian papaya fruit fly (*Bactrocera dorsalis* (syn. *B. invadens*, *B. papayae*, *B. philippinensis*))	150 kinds of fruit and vegetables, including, apricot, avocado, banana, citrus, coffee, fig, guava, loquat, mango, roseapple, papaya, passionfruit, peach, pear, persimmon, pineapple, surinam cherry and tomato	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	HIGH	HIGH	HIGH	HIGH	**HIGH**
Spotted wing drosophila (*Drosophila suzukii*)	Wide host range including, apple, blueberry, blackberry, grapes, strawberry, peach, raspberry, cherry, plum, persimmon, pear, nectarine and apricot	Fruit, inflorescence	Infested plant material. Adults are capable of flight.	HIGH	HIGH	HIGH	HIGH	**HIGH**

Common name (scientific name)	Host(s)	Affected plant part	Means of movement & dispersal	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)								
Brown marmorated stink bug, Yellow-brown stink bug (*Halyomorpha halys*)	Wide host range with over 100 species reported as hosts including, hazelnut, pecan, walnut, cotton, sweetcorn, soybeans, maple, oak, fig, grapes, cherry, peach, olive and vegetable crops, citrus, blueberry and rubus.	Leaves and fruit	Infested plant material and hitchhiking. Adults capable of flight.	HIGH	HIGH	HIGH	HIGH	**HIGH**
Glassy-winged sharpshooter *Homalodisca vitripennis* (with *Xylella fastidiosa*)	Very broad host range including blackberry, grapevine, citrus, plum, almond, peach, macadamia, pistachio and ornamentals, okra, apricot cherry	Leaves, stems	Infested plant material. Adults are capable of flight[3]	MEDIUM-HIGH	HIGH	HIGH	HIGH	**HIGH**
LEPIDOPTERA (Butterflies and moths)								
Asian gypsy moth (*Lymantria dispar*)[4]	Wide host range including apple, European pear, Almond-leaved pear (*P. amygdaliformis*), European crab apple (*M. sylvestris*), chestnut, hazelnut, pecan, pistachio, walnut, *Prunus* spp., *Pinus* spp., maples, oaks, elms, box elder, birches, red gum, maize, *Rubus* spp., blueberry, spruce.	Leaves, flowers	Infested plant material, soil and machinery. Adults capable of flight.	HIGH	HIGH	HIGH	HIGH	**HIGH**

[3] Adult glassy-winged sharpshooters are strong fliers and can move rapidly from plant to plant. Nymphs are wingless and cannot fly but can distribute themselves by walking and jumping through the canopy or dropping from plants and walking to new hosts. Most rapid and long-distance movement is as viable egg masses in nursery stock of either crop or ornamental plants.

[4] There are three subspecies of *Lymantria dispar*: *L. d. dispar* (L.) (European gypsy moth), *L. d. asiatica* (Vnukovskij), and *L. d. japonica* (Motschulsky). Both *L. d. asiatica* and *L. d. japonica* are considered to be Asian gypsy moths. *L. d. asiatica* is found in temperate Asia from the Ural Mountains east to China, Korea and the Russian Far East. *L. d. japonica* is found in Japan. *L. d. dispar* is found in southern Europe, Northern Africa and North America.

Common name (scientific name)	Host(s)	Affected plant part	Means of movement & dispersal	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
PATHOGENS AND NEMATODES								
BACTERIA (including phytoplasmas)								
Phony disease of peach, plum leaf scald, Pierce's disease of grapevines (*Xylella fastidiosa*[5,6])	Broad host range including peach, plum, apricot, cherry, sour cherry, coffee, lucerne, raspberry, grapevine, pear, almond, elm, sycamore, mulberry, oak, periwinkle, red maple, citrus and blueberry.	Leaves, shoots, fruit, roots, whole plant (stunting)	Transmitted by infected plant material. Spread by sap sucking insects[7]	HIGH	HIGH	HIGH	HIGH	**HIGH**
VIRUSES AND VIROIDS								
Sharka (*Plum pox virus* (*Potyvirus*))	*Prunus* spp. sour cherry, sweet cherry, plum, apricot, almond, peach, *P. besseyi* (bessey cherry), *P. cerasifera* (myrobalan plum), bitter cherry tree, dwarf cherry, mahaleb cherry, bird cherry, Canada plumtree, pin cherry, Japanese plum, (other natural hosts: clovers, dandelion, common privet, flowering almond and *P. japonica* (Japanese bushy cherry tree).	Leaves, stems, fruit, seeds	Transmitted by infected plant material (plants may not show symptoms) and grafting. Spread by aphid vectors[8]	MEDIUM	HIGH	HIGH	EXTREME	**HIGH**

[5] At least six different subspecies of *X. fastidiosa* have been reported; *X. fastidiosa* subsp. *fastidiosa, X. fastidiosa* subsp. *multiplex*; *X. fastidiosa* subsp. *pauca*; *X. fastidiosa* subsp. *Sandyi*, *X. fastidiosa* subsp. *tashke; X. fastidiosa* subsp. *morus*

[6] *X. fastidiosa* subsp. *multiplex*, subsp. *pauca* and subsp. *fastidiosa* have been detected on plum; *X. fastidiosa* subsp. *multiplex* has been detected on apricot; *X. fastidiosa* subsp. *multiplex* and subsp. *fastidiosa* and subsp. *pauca* have been detected on peach.

[7] All sap sucking insects may have some potential to vector this pathogen, of most concern is the unknown ability of native Australian sap sucking insects to transmit *Xylella fastidiosa* strains. Important vectors overseas include *Homalodisca vitripennis, Philaenus spumarius, Xyphon fulgida*, *Draeculacephala minerva* and *Graphocephala atropunctata*

[8] Vectors include *Aphis spiraecola* and *Myzus persicae* which are both present in Australia

Pollination pests

Although there are a variety of mechanisms for pollination, the European honey bee (*Apis mellifera*) is the most important insect pollinator of cultivated agricultural and horticultural crops. Pollination services of the European honey bee is provided by beekeepers to growers of pollinator-reliant crops.

As honey bees forage for nectar and pollen their activities pollinate plants, resulting in increased seed or fruit set, improved fruit shape and more even maturation of some crops.

Both established and exotic pests of honey bees (bee pests) and bee species that compete with honey bees (pest bees) can have a major impact on crop pollination services. Bee pests and pest bees can also impact unmanaged colonies which provide “free” pollination.

The summerfruit industry is regarded as a pollination-reliant industry and honey bee pests and pest bees can impact the summerfruit industry, through reduced pollination and therefore yield. A list of the high priority bee pests and pest bees which could impact the summerfruit industry can be located on the PHA website **http://www.planthealthaustralia.com.au/industries/honey-bees/** and the BeeAware website **http://beeaware.org.au/pests/**

Established pests of biosecurity significance

Introduction

This section identifies established pests of biosecurity significance for the summerfruit industry in Australia. By identifying and prioritising established pests which summerfruit producers already have to manage, mechanisms can be put in place to better align industry and government resources and provide a stronger base for biosecurity risk management for the summerfruit industry.

Identification of established pests of significance will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers, surveillance coordinators, diagnosticians and development of pest-specific mitigation activity.

Threat identification

Information on established pests of the summerfruit industry described in this document came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment.

Prioritising pest threats

Although established pests listed in this plan (Table 2) had to meet the criteria listed below for establishment, spread and economic impact, these pests did not undergo a formal pest risk assessment. These pests were considered in an effort to prioritise investment.

> **Spread:** The natural spread of the pest to most production areas is largely unhindered and assisted spread within Australia is also difficult to manage. There may be state or territory specific regulations in place to prevent the pest spreading.
>
> **Establishment:** The pest has the potential to survive and become established throughout most or all of the range of hosts. Distribution is not limited by environment conditions that prevail in Australia. Based upon its current distribution in Australia, and known conditions of survival, it is likely to survive in Australia in the majority of regions where the host is grown.

Economic Impact: There are severe impacts on production including host mortality and/or significant impacts on either crop quality or storage losses, and/or severe impacts on market access.

Table 2. *Established pests of biosecurity significance.*

Common name (Scientific name)	Hosts	Affected plant part	Distribution in Australia	State movement controls or markets impact by pests	Factsheets	Comments
INVERTEBRATES						
COLEOPTERA (Beetles and weevils)						
Fuller's rose beetle/ weevil (*Naupactus cervinus* (syn. *Pantomorus cervinus, Asynonychus cervinus*))	Apricot, plum, peach, nectarine, ornamental plants, fresh vegetables, apples, berries and citrus.	Leaves, young shoots, buds, roots	All states (excluding NT)	Pest of critical quarantine concern to China [9,10]	Yes-NSW DPI[11] Summerfruit[10], citrus[12,13]	This pest can lay eggs on fruit, making it unmarketable and impact the plant by chewing leaf margins.
Garden weevil, vine calandra (*Phlyctinus callosus*)	Apricot, plum, peach, nectarine, carrot, apple, parsnip, grapevine and cherry.	Leaves, stems, fruit, roots	NSW, SA, TAS, VIC, WA	Pest of critical quarantine concern to China[9]	Yes- Summerfruit[10], DPIRD[14]	
DIPTERA (Flies and midges)						
Mediterranean fruit fly (*Ceratitis capitata*)	Wide host range including apricot, plum, peach and nectarine.	Fruit	WA	Pest of critical quarantine concern to China[9] Movement controls exist in Vic, Qld, Tas, NT, SA	Yes-PHA[15,18], NSW DPI[16], Summerfruit[10]	

[9] Plant Export Operations Work Plan Summerfruit (Nectarine, Peaches, Plums and Apricots) exports to the People's Republic of China. Aust Govt DA. Version 1.3 Jan 2019. https://micor.agriculture.gov.au/Plants/Protocols%20%20Workplans/China%20Summerfruit%20Work%20Plan.pdf
[10] Summerfruit (Nectarines, Peaches, Plums and Apricots) exports to the People's Republic of China– Integrated Pest Management Program 2018
[11] https://www.dpi.nsw.gov.au/agriculture/horticulture/citrus/content/insects-diseases-disorders-and-biosecurity/inect-pest-factsheets/fullers-rose-weevil
[12] http://www.pir.sa.gov.au/__data/assets/pdf_file/0009/285534/Fullers_Rose_Weevil_in_Citrus_Fact_Sheet.pdf
[13] https://www.citrusaustralia.com.au/wp-content/uploads/Orchard-Management.pdf
[14] https://www.agric.wa.gov.au/pome-fruit/garden-weevil-vineyards
[15] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/QFly-and-Medfly-FS.pdf
[16] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/590554/exotic-pest-alert-mediterranean-fruit-fly.pdf

Common name (Scientific name)	Hosts	Affected plant part	Distribution in Australia	State movement controls or markets impact by pests	Factsheets	Comments
Queensland fruit fly (*Bactrocera tryoni*)	Wide host range including apricot, plum, peach and nectarine.	Fruit	NT, QLD, VIC, NSW	Pest of critical quarantine concern to China[9] Movement controls exist in WA, Tas, SA. Movement controls within the Greater Sunraysia Pest Free Area (Vic and NSW)	Yes-PHA[17,18], NSW DPI[19], Summerfruit[10]	
Jarvis' fruit fly (*Bactrocera jarvisi*)	Wide host range including apricot, plum, peach and nectarine.	Fruit	NT, WA, QLD, NSW, WA	Pest of critical quarantine concern to China[9]	Summerfruit[10], PHA[18]	
Lesser Queensland fruit fly (*Bactrocera neohumeralis*)	Wide host range including apricot, plum, peach, nectarine, mango, banana, passionfruit, loquat, apple, pear, citrus, coffee, capsicum and tomato.	Fruit	QLD, NSW	Pest of critical quarantine concern to China[9] Movement controls exist in WA.	Summerfruit[10], PHA[18]	
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)						
Black peach aphid (*Brachycaudus persicae*)	Apricot, plum, peach, nectarine, Japanese plum and cherry.	Leaves	Present in all states and territories except NT.	Pest of critical quarantine concern to China[9] Declared pest in Vic.	Yes-NSW DPI[20], Summerfruit[10]	Vector for Plum Pox Virus

[17] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/QFly-and-Medfly-FS.pdf
[18] http://www.planthealthaustralia.com.au/wp-content/uploads/2018/10/The-Australian-Handbook-for-the-Identification-of-Fruit-Flies-v3.1.pdf
[19] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0014/230612/queensland-fruit-fly.pdf
[20] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/184526/summerfruit-fulla.pdf

Common name (Scientific name)	Hosts	Affected plant part	Distribution in Australia	State movement controls or markets impact by pests	Factsheets	Comments
Pear scale (*Diaspidiotus pyri*)	Apricot, plum, peach and nectarine	Branches, leaves	Tas (absent from mainland Australia)	Pest of critical quarantine concern to China[9] Movement controls exist in WA.	Summerfruit[10]	
LEPIDOPTERA (Butterflies and moths)						
Codling moth (*Cydia pomonella*)	Wide host range including plum, peach apricot, nectarines, cherry and apple, pear, citrus and walnut.	Fruit	QLD, NSW, SA, TAS, VIC, (absent in WA)	Pest of critical quarantine concern to China[9] Movement controls exist in WA.	Yes-Agriculture Victoria[21], DPIRD[22] Summerfruit[10]	
Light brown apple moth (*Epiphyas postvittana*)	Wide host range including apricot, plum, nectarine and peach.	Leaves, fruit	NSW, QLD, SA, TAS, VIC, WA	Pest of critical quarantine concern to China[9]	Yes- Agriculture Victoria[23] Wine Australia[24] Summerfruit[10], NSW DPI[20]	
Oriental fruit moth (*Grapholita molesta* syn. *Cydia molesta)*	Apricot, peach, nectarine, plum, sweet cherry, almonds, apple, pear and quince.	Buds, fruit, leaves	NSW, QLD, SA, TAS, VIC (absent in WA)	Movement controls exist in WA.	Yes-NSW DPI[20], Agriculture Victoria[25]	

[21] http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-insects-and-mites/codling-moth
[22] https://www.agric.wa.gov.au/plant-biosecurity/codling-moth-declared-pest
[23] http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-insects-and-mites/light-brown-apple-moth-in-orchards
[24] https://www.wineaustralia.com/WineAustralia/media/WineAustralia/PDF/Growing-and-making/Pests-diseases/201307-Light-brown-apple-moth.pdf
[25] http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-insects-and-mites/oriental-fruit-moth

Common name (Scientific name)	Hosts	Affected plant part	Distribution in Australia	State movement controls or markets impact by pests	Factsheets	Comments
THYSANOPTERA (Thrips)						
Plague thrips (*Thrips imaginis)*	Apricot, peach, nectarine, plum, cherry, lettuce, beans, tomatoes, cucurbits, cherry and pome fruit.	Whole plant	Widespread	Pest of critical quarantine concern to China[9]	Yes-NSW DPI[26,20], Hort Innovation[27] and Summerfruit[10]	This pest feeds on plant tissue causing distorting growth, leaf scarring and malformed flowers. It can vector cherry viruses.
Western flower thrips (*Frankliniella occidentalis)*	Highly polyphagous least 250 plant species, 65 families including cherry, apricot, peach**,** plum, nectarine.	Fruit, flowers, leaves	NSW, QLD, SA, TAS VIC, WA (absent in NT)	Movement restrictions into the Toolangi Plant Protection District (Victoria) of any nursery plants, cut flowers or leafy vegetables[28]. Movement controls exist in NT.	Yes-NSW DPI[20,26] and Hort Innovation[27]	This pest feeds on plant tissue causing distorting growth, leaf scarring and malformed flowers. It can vector cherry viruses.
Black plague thrips (*Haplothrips froggatti*)	Nectarine, peach, plum and apricot.		WA, Qld	Pest of critical quarantine concern to China[9]	Summerfruit[10]	
PATHOGENS AND NEMATODES						
BACTERIA (including phytoplasmas)						
Bacterial canker (*Pseudomonas syringae* pv *syringae*)	Wide host range including apricot, plum and peach.	Whole plant	WA, SA, NSW, Vic, Tas, Qld and NT	Movement controls in NT	Yes – NSW DPI[20,29]	Cherries and apricots are more susceptible than peaches, nectarines and plums.

[26] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/177329/stone-and-pome-thrips.pdf
[27] https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/ny15002-thrips-pest-mgmt-plan.pdf
[28] http://agriculture.vic.gov.au/agriculture/horticulture/moving-plants-and-plant-products/moving-plants-within-victoria/compliance-and-verification-agreements/plant-material-imported-into-the-toolangi-plant-protection-district
[29] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0015/41514/Bacterial_canker_of_stone_fruit_-_Primefact_77.pdf

Common name (Scientific name)	Hosts	Affected plant part	Distribution in Australia	State movement controls or markets impact by pests	Factsheets	Comments
FUNGI						
Brown rot (*Monilinia fructicola*)	Nectarine, peach, plum, apricot and sweet cherry.	Fruit, flower, stem	NSW, QLD, SA, TAS, VIC, WA	Pest of critical quarantine concern to China[9]	Yes-PHA[30], NSW DPI[20], Summerfruit[10]	Brown rot causes dark lesions and softening of fruit tissue.
Blossom blight (*Monilinia laxa*)	Peach, cherry, apricot and almond.	Fruit, flower, stem, leaves	NSW, QLD, SA, TAS, VIC, WA		Yes – NSW DPI[20]	
VIRUSES AND VIROIDS						
Almond bud failure (*Prunus necrotic ringspot virus*)	*Prunus* species including nectarine, peach, plum, apricot and cherry.	Fruit, leaves, whole plant (rosetting)	NSW, QLD, SA, Tas, Vic	Pest of critical quarantine concern to China[9]	Yes- Summerfruit[10]	

[30] **http://www.planthealthaustralia.com.au/pests/brown-rot/**

Established weeds of biosecurity significance

Introduction

This section identifies established weeds of biosecurity significance for the summerfruit industry. By identifying and prioritising weeds which summerfruit producers already have to manage, or may have to deal with in the future, mechanisms can be put in place to better align industry and government resources and provide a strong base for biosecurity risk management for the summerfruit industry.

Although weeds were not formally included in the EPPRD at the time that this biosecurity plan was released, exotic weeds may be responded to in a similar way to exotic plant pests in the future. Therefore, it is critical that the summerfruit industry start reviewing the threat of weeds to their production system.

Identification of weeds of significance will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers and botanists, and development of specific incursion response plans if an incursion of the weed occurs, or if the weed spreads further in production regions of Australia.

Threat identification

Information on weeds of the summerfruit industry described in this document came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment.

Prioritising weed threats

Although established weeds listed in this plan (Table 3) had to meet the criteria listed below for establishment, spread and economic impact, these pests did not undergo a formal pest risk assessment. These weeds were considered in an effort to prioritise investment.

Spread: The natural spread of the weed to most production areas is largely unhindered and assisted spread within Australia is also difficult to manage. There may be state or territory specific regulations in place to prevent the pest spreading.

Establishment: The weed has the potential to survive and become established throughout most or all of the range of hosts. Distribution is not limited by environment conditions that prevail in Australia. Based upon its current distribution in Australia, and known conditions of survival, it is likely to survive in Australia in the majority of regions where the host is grown.

Economic Impact: There are severe impacts on production including host mortality and/or significant impacts on either crop quality or storage losses, and/or severe impacts on market access.

Table 3. *Established weeds of biosecurity significance.*

Common name (scientific name)	Distribution in Australia	State movement controls or markets impacted by weed	Factsheets	Additional comments
Paspalum (*Paspalum dilatatum*)	Widespread		NSW DPI[31], FloraBase[32], Agriculture Victoria[33], Biosecurity Queensland[34]	
Geranium (*Geranium molle*)	NSW, ACT, Vic, Tas, SA, Qld, WA		Biosecurity Queensland[35], NSW DPI[36], DPIPWE[37]	

[31] https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/species-varieties/paspalum
[32] https://florabase.dpaw.wa.gov.au/browse/profile/527
[33] http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/sip_paspalum
[34] https://keyserver.lucidcentral.org/weeds/data/media/Html/paspalum_dilatatum.htm
[35] https://keyserver.lucidcentral.org/weeds/data/media/Html/geranium_molle.htm
[36] http://weeds.dpi.nsw.gov.au/Weeds/Details/209
[37] https://dpipwe.tas.gov.au/Documents/80484%20-%20Weed%20Handbook%20170x240FINAL17-11-2011.pdf

Common name (scientific name)	Distribution in Australia	State movement controls or markets impacted by weed	Factsheets	Additional comments
African Lovegrass (*Eragrostis curvula*)	Widespread	Priority weed for the South East NSW Importation, sale and distribution of African lovegrass is prohibited in Tasmania. Declared noxious weed in Victoria[38] **Regionally controlled** in the North Central, Corangamite, Port Phillip and Western Port, Goulburn Broken, North East, West Gippsland and East Gippsland catchments. **Restricted** in the Mallee, Wimmera and Glenelg Hopkins catchments	Biosecurity Queensland[39], NSW DPI[40], Agriculture Victoria[41], DPIPWE[42]	
Nutsedge (*Cyperus eragrostis*)	Widespread		Biosecurity Queensland[43], Florabase[44]	
Ryegrass (*Lolium species*)	Widespread		Biosecurity Queensland [45]	Increase in herbicide resistance (glyphosate resistance especially)

[38] www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/declared-noxious-weeds-and-pest-animals-in-victoria
[39] https://www.daf.qld.gov.au/__data/assets/pdf_file/0011/69284/IPA-African-Lovegrass-PP63.pdf
[40] http://weeds.dpi.nsw.gov.au/Weeds/Details/3
[41] http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/weeds/a-z-of-weeds/african-lovegrass
[42] https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/african-lovegrass
[43] https://keyserver.lucidcentral.org/weeds/data/media/Html/cyperus_eragrostis.htm
[44] https://florabase.dpaw.wa.gov.au/browse/profile/792
[45] https://keyserver.lucidcentral.org/weeds/data/media/Html/lolium_perenne.htm

Implementing biosecurity for the Australian Summerfruit Industry 2019-2022

Following the prioritisation and gap analysis through the Biosecurity Implementation Group (BIG) biosecurity planning process, both industry and government have developed an implementation plan that sets out shared biosecurity goals and objectives. This section contains a Biosecurity Implementation Table which should act as a guide for biosecurity activities for the summerfruit industry and the government for 2019-2022. It is intended that the plan is monitored using annual review by the Biosecurity Reference Panel.

Biosecurity Implementation Table

The Biosecurity Implementation Table aims to build upon the themes outlined in the Intergovernmental Agreement on Biosecurity (IGAB)[46] and the National Plant Biosecurity Strategy (NPBS)[47] by providing a clear line of sight between the development of this Biosecurity Plan and broader plant health policy and legislation.

This table aims to provide the focus and strategic direction for plant biosecurity activities relating to the summerfruit industry over the next five years (i.e. the life of this Biosecurity Plan). The table provides specific recommendations on potential biosecurity activities identified by both industry and government to improve biosecurity preparedness for pest threats.

This table has been developed in recognition that biosecurity is a shared responsibility between the summerfruit industry and governments, and for this reason, the Biosecurity Implementation Table has been produced to help coordinate actions and resources in the biosecurity system, with the view of creating an effective and productive biosecurity partnership. Activities may require additional funding to be sourced prior to commencement. By implementing the specific actions listed in the Biosecurity Implementation Table, it will not only strengthen the summerfruit biosecurity system, but also the broader plant biosecurity system. Future versions of this table will contain information on the progress made by governments and industry on the Biosecurity Implementation Table (Table 4).

[46] For more information visit **https://www.agriculture.gov.au/biosecurity/partnerships/nbc/intergovernmental-agreement-on-biosecurity**

[47] For more information visit **www.planthealthaustralia.com.au/national-programs/national-plant-biosecurity-strategy/**

Table 4. *The Biosecurity Implementation Table for the Australian Summerfruit Industry (2019-2022).*

Strategy: Capacity and Capability

Aligns with Strategy 4 of NPBS, Schedule 6 of IGAB

Action	Responsible party (Other involved parties)	Due date	Current activities
a) Establish a biosecurity reference panel (BRP) to help coordinate future biosecurity activities/priorities, develop key biosecurity messages/materials, and review the implementation plan. • Ensure researchers are represented on BRP panel to provide guidance on R&D. • Consult with BRP group prior to BRP meetings to determine areas where technical expertise is required	PHA (Industry, State and Territory Governments)	2019 and then annually	
b) Ensure that biosecurity priorities requiring funding, action or notification are tabled with the relevant funding body or committee • BRP to identify potential concept proposals to submit to Hort Innovation, in consultation with the summerfruit SIAP. • BRP to identify potential cross sectoral priorities to submit to Plant Biosecurity Research Initiative (PBRI) • PHA to establish mechanisms to notify SNPHS and SPHD of biosecurity priorities	PHA, BRP and industry	Annually at biosecurity reference panel (BRP) meeting	
c) Identify mechanisms to fund biosecurity • Identify mechanisms to access funds for biosecurity through the PHA levy • Establish an MoU between PHA and Summerfruit Australia for use of funds associated with the PHA levy • Identify alternative sources of funding for biosecurity activities	Industry and PHA	Review Annually at BRP meeting	Summerfruit Australia regularly review levy priorities

Action		Responsible party (Other involved parties)	Due date	Current activities
d)	Ensure PHA deed training is undertaken by industry board members and other key stakeholders to increase general biosecurity awareness • Summerfruit Australia and Canned Fruits Industry Council of Australia staff to complete the PHA Foundation Course • CCEPP representatives to complete the National EPP Response Management course • NMG representatives to complete the National EPP Response Management course • Summerfruit Australia and Canned Fruits Industry Council of Australia to ask PHA for face-to-face EPPRD training if there are any changes in Board members	Industry and PHA	2019-2022 and where there are any staffing changes at Summerfruit Australia.	
e)	Seek opportunities to collaborate with industries with common pests and programs in place • Review outcomes from National Temperate Fruits Biosecurity Surveillance Strategy	Relevant Industries	Ongoing	National Temperate Fruits Biosecurity Surveillance Strategy, Fruit Fly Council, Xylella co-ordinator
f)	Integrate best biosecurity practice principles into sectoral and cross-sectoral quality assurance programs • Review what biosecurity components currently exist in QA programs such as HARPS and Global Gap QA programs	Industry, Service Industry Consultants, Supermarkets	2022	

Action	Responsible party (Other involved parties)	Due date	Current activities
g) Investigate national and international research and pest specific capacity and capability • Develop a database of who, what and where resources are available e.g. list of state labs for diagnostic testing, contact points for reporting, researchers working on HPPs, domestic and international research collaborations. • Summerfruit Australia to identify their technical experts for all HPPs.	Industries, PHA, State and Territory Governments, NHRN	Develop by end 2020	

Strategy: Plant Biosecurity Education and Awareness

Aligns with Strategy 7 of NPBS, Schedule 6 of IGAB

Action	Responsible party (Other involved parties)	Due date	Current activities
a) Identify industry biosecurity training and extension needs and recommend priorities to appropriate service provider. • Update the Summerfruit Industry Biosecurity Manual • Review/develop factsheets on HPPs or specific practices • Raise awareness and encourage completion of on-line biosecurity training courses to growers: PHA Foundation Course, National EPP Response Management Course, EPPRD training • Investigate the development of industry specific biosecurity training modules, delivered through platforms such as TAFE horticultural courses.	BRP (PHA), State and Territory governments, Industry, Service Providers	Annually at BRP meeting	Summerfruit Australia developing a biosecurity page on website linking to relevant factsheets and online training resources.
b) Deliver an industry biosecurity program with a focus on biosecurity awareness.	Industry, BRP (priority at first reference panel meeting)	Ongoing	Summerfruit Australia to consider development of industry biosecurity program at next board meeting

Action	Responsible party (Other involved parties)	Due date	Current activities
c) Continue to promote, disseminate and demonstrate biosecurity information to industry through industry forums, newsletters, road shows, field days, networks and/or workshops (hardcopy and online), presentations at Hort Connections Conferences. For cross sectorial HPPs, co-ordinate activities with other relevant industries. • Raise awareness of exotic and established HPPs. • Promote the importance of early reporting of exotic plant pests • Highlight the need for pest monitoring and importance of record keeping through the biosecurity manual and publication of articles. • Raise awareness of the Australian biosecurity system, including border security arrangements, through publication of articles in industry newsletters and Tendrils (PHA newsletter). • Raise awareness of the Fruit Fly council newsletter: **preventfruitfly.com.au/newsletter/** • Raise awareness of the on-farm biosecurity website: farmbiosecurity.com.au • Raise awareness of the BeeAware website: **beeaware.org.au**	Industry, State and Territory Governments, PHA, relevant Industries	Ongoing to various audiences	Summerfruit Australia developing a biosecurity page on website linking to relevant factsheets and online training resources. Summerfruit Australia distributes a weekly e-newsletter to 500+ growers.
d) Raise awareness of the Australian Honey Bee Industry Council Code of Practice for growers who utilise managed hives for pollination. Growers to request certificate of compliance from beekeepers	Industry	Ongoing	PHA published articles in the farm biosecurity newsletter to raise awareness of the Code of Practice amongst growers

Strategy: Preparedness and Response

Aligns with Strategy 3 of NPBS, Schedule 7 of IGAB

	Action	Responsible party (Other involved parties)	Due date	Current activities
a)	Maintain a grower database to facilitate provision of critical information in the event of an emergency response	Industry, BRP	Ongoing	Summerfruit Australia has a database, that provides good coverage of growers,
b)	Consider the implementation of Property Identification Codes (PICs) for the purpose of identifying land used for agricultural purposes and to enable traceability and information flow in the event of an emergency response	Industry, PHA	Ongoing	PHA to provide an update at BRP
c)	Develop/update **industry specific** contingency/business continuity plans for high priority pests (HPPs) • BRP to identify priorities for development of contingency plans • Funding proposals for development of contingency plans to be submitted to Hort Innovation	Industry (Hort Innovation, PBRI, PHA)	Annually at BRP meeting	AgVic developing a database of consolidated contingency plans.
d)	Develop/update **cross-sectoral** contingency/business continuity plans for HPPs • PHA to identify priorities for development of contingency plans affecting multiple industries • Funding proposals to be submitted to Hort Innovation or PBRI	Industry (Relevant Industries, Hort Innovation, Commonwealth, PBRI, PHA)	Annually at BRP meeting	Contingency plan for Spotted Wing Drosophila currently being developed.

	Action	Responsible party (Other involved parties)	Due date	Current activities
e)	Consider categorisation of HPPs in the Emergency Plant Pest Response Deed. • *Anastrepha* species • *Drosophila suzukii* • *Halyomorpha halys* • *Lymantria dispar* • *Homalodisca vitripennis* BRP to prioritise annually based on interceptions (entry risk) or emerging pest issues	Industry (State and Territory Governments, Commonwealth, PHA)	Prioritise annually at BRP meeting	Categorisation for BMSB currently being undertaken
f)	Consider development of emergency permits for HPPs of the industry • Review information on what emergency use permits are currently available for use with HPPs. Review expired emergency permits and submit to AVPMA for registration • Review information on what chemicals are currently in use in Australia that could be used to treat HPPs (through minor use permits). • Funding proposals for development of emergency permits and minor use permits to be submitted to Hort Innovation	Industry (Hort Innovation, APVMA, PHA)		
g)	Risk mitigation activities for planting material • Promote clean planting material by working with nursery industry	Summerfruit Australia, Nursery and Garden Industry Association	Ongoing	NGIA clean planting scheme
h)	Review information and ratings for *Thaumatotibia leucotreta* (False codling moth) at first BRP meeting.	BRP	2019	Complete
i)	Review information and ratings for *Xylella fastidiosa* vectors at BRP meetings	BRP	Annually	

Strategy: Surveillance

Aligns with Strategy 2 of NPBS, Schedule 4 of IGAB

	Action	Responsible party (Other involved parties)	Due date	Current activities
a)	Identify surveillance needs for HPPs (with a focus on industry specific HPPs) • BRP to identify actions for surveillance for industry's HPPs (e.g. early detection critical for potential eradication, absence data required for area freedom, early detection or early warning needed to improve management outcomes, general surveillance useful for detecting the pest) • Work with the Subcommittee on National Plant Health Surveillance (SNPHS) to recommend surveillance for HPPs	BRP	Annually at BRP meeting	
b)	Identify mechanisms to fund surveillance, partnerships to implement surveillance programs, and develop surveillance programs for early detection of HPPs or market access • Where possible link into existing pest monitoring programs	Industry (Hort Innovation, State and Territory Governments, Commonwealth, PHA)	Ongoing	
c)	Develop surveillance tools to support data capture or pest reporting • Investigate adoption or adaption of a surveillance tool to capture industry surveillance data. (eg. MyPestGuide) • Investigate national collection and storage/maintenance of surveillance data	Industry and State and Territory Governments (Hort Innovation, PHA)	>2019	

Strategy: Diagnostics

Aligns with Strategy 5 of NPBS, Schedule 4 of IGAB

	Action	Responsible party (Other involved parties)	Due date	Current activities
a)	Identify diagnostic needs for HPPs. • BRP to identify and prioritise actions for diagnostic tests for the summerfruit industry HPPs • Identify list of laboratories that can perform diagnostic tests for HPPs • Determine capacity of designated laboratories to perform diagnostic tests during an incursion (ie. surge capacity) • Undertake research into the impact of native species on HPP diagnostic protocols, i.e. do native species cause false positive results.	BRP (PHA)	2019	
b)	Identify mechanisms to fund diagnostic priorities	BRP (Hort Innovation State and Territory Governments, PBRI)	Annually at BRP meeting	
c)	Develop National Diagnostic Protocols for HPPs (as prioritised) • *Anastrepha* spp. • *Bactrocera dorsalis* • *Drosophila suzukii* • *Halyomorpha halys* Engage with SPHD on draft National Diagnostic protocols for: • *Lymantria dispar*	BRP (Hort Innovation, State and Territory Governments, Commonwealth, PHA, SPHD, PBRI)	Annually at BRP meeting	Fruit Fly Handbook provides diagnostic information for *Bactrocera dorsalis*, *Drosophila suzukii* and *Anastrepha* spp.

Strategy: Established Pests and Weeds

Aligns with Strategy 6 of NPBS, Schedule 5 of IGAB

	Action	Responsible party (Other involved parties)	Due date	Current activities
a)	Raise industry awareness of established pests and weeds of biosecurity significance. Increase awareness of established pests and weeds amongst crop scouts and agronomists. • Include established pests and weeds of biosecurity significance in biosecurity awareness material, and in the Summerfruit Industry Biosecurity Manual. • Promotion of existing biosecurity awareness material including IPM manuals and NSW Orchard Guide.	Industry, State and Territory Governments (PHA)	2022	IPM manual, NSW Orchard Guide Summerfruit Australia to provide biosecurity information on website
b)	Identify mechanisms to fund surveillance, partnerships to implement surveillance programs, and develop surveillance programs for established pests of market access concern.	Industry and State and Territory Governments	Annually at BRP meeting	
c)	Undertake targeted surveillance for established pests of market concern for the industry.	Industry		Pest monitoring for China exports
d)	Investigate opportunities to develop cross sectoral research programs to manage established pests	Relevant industries, Hort Innovation, PBRI		

Strategy: Biosecurity Research, Development and Extension (RD&E)

Aligns with Strategy 8 of NPBS, Schedule 8 of IGAB

	Action	Responsible party (Other involved parties)	Due date	Current activities
a)	Prioritise biosecurity R,D & E activities annually for input into Hort Innovation plant biosecurity R,D & E implementation priorities	Industry (Hort Innovation, PBRI)	Annually	
b)	Consider R,D & E to meet market access requirements	Industry, (Hort Innovation, SDQMA)	Annually	
c)	Investigate cross sectoral investment/engagement opportunities through communication with PBRI • Keep a watching brief on cross-sectoral initiatives of importance to the summerfruit industry	Industry and PBRI	Ongoing	
d)	Support and monitor relevant fruit fly RD&E initiatives either underway or planned • SITplus initiative and area wide management • Qfly and Medfly disinfestation • Support continuation of the Goulburn Murray Valley Fruit Fly Program, Yarra Valley and Sunraysia fruit fly programs • DNA diagnostics for fruit flies	Industry, Hort Innovation Fruit Fly Fund, state governments	Ongoing	Fruit Fly Council considers RD&E initiatives

Strategy: Legislative and Regulatory Issues of Importance

Aligns with Strategy 1 of NPBS

	Action	Responsible party (Other involved parties)	Due date	Current activities
e)	Raise awareness that in all states and territories, growers have a responsibility to practice good biosecurity under relevant biosecurity acts • State agencies to provide notification of any changes to biosecurity legislation to PHA and peak industry bodies.	Industry, State and Territory Governments, Commonwealth, PHA	Ongoing	

Australian Summerfruit Industry - biosecurity preparedness

This document represents the second industry biosecurity planning process undertaken for the Australian industry.

The following table (Table 5) has been populated with the high priority pests of the summerfruit industry. The aim of this table is to document the current preparedness documents and activities which are available and are currently being undertaken. This will allow industry, governments and RD&E agencies to better prepare for these high priority pests and align future activities as listed in the Biosecurity Implementation Table (Table 4).

Table 5. *Documents and activities currently available for high priority pests of the Summerfruit Industry*[48,49]

Common name (scientific name)	National diagnostic protocol[50]	Surveillance programs	Fact sheets	Contingency plan	EPPRD Category	National Priority Pest	Collaborators
INVERTEBRATES							
DIPTERA (Flies and midges)							
Mexican fruit fly (*Anastrepha ludens*)	Not developed	Not covered by a specific surveillance program	YES – Citrus[51]	Not developed	Not categorised	YES – 3	Citrus
Sapodilla fruit fly, Sapote fruit fly (*Anastrepha serpentina*	Not developed	Not covered by a specific surveillance program	Not developed	Not developed	Not categorised	YES – 3	No other parties affected
Guava fruit fly (*Anastrepha striata*)	Not developed	Not covered by a specific surveillance program	Not developed	Not developed	Not categorised	YES – 3	No other parties affected
Oriental fruit fly (*Bactrocera dorsalis* (syn. *B. invadens*, *B. papayae*, *B. philippinensis*))	Not developed	YES – NAQS, NSW, NT, QLD, TAS, VIC, WA, SA	YES – Mango[52], Apple and Pear[53], Summerfruit[54], Papaya[55], Avocado[56] Cherry[57]	Not developed	2	YES – 3	Apple and Pear, Avocado, Banana, Coffee, Cherry, Citrus, Lychee, Papaya, Passionfruit, Tomato, Vegetable, Viticulture

[48] Copies of these documents are available from www.planthealthaustralia.com.au/pidd
[49] Information presented has been taken from the National Plant Health Status Report 2017 and confirmed or updated through either Plant Health Committee, the Subcommittee on Plant Health Diagnostic Standards, the Subcommittee on National Plant Health Surveillance or other stakeholders
[50] From http://plantbiosecuritydiagnostics.net.au/resource-hub/priority-pest-diagnostic-resources/
[51] http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Exotic-fruit-flies-FS.pdf
[52] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Oriental-fruit-fly-complex-FS-Mango.pdf
[53] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Oriental-fruit-fly-FS.pdf
[54] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Oriental-fruit-fly-complex-FS-Summerfruit.pdf
[55] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/09/Oriental-fruit-fly-complex-FS-Papaya.pdf
[56] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Oriental-fruit-fly-complex-FS-Avocado.pdf
[57] http://www.planthealthaustralia.com.au/wp-content/uploads/2019/05/Oriental-fruit-fly-FS-cherries.pdf

Common name (scientific name)	National diagnostic protocol[50]	Surveillance programs	Fact sheets	Contingency plan	EPPRD Category	National Priority Pest	Collaborators
Spotted wing drosophila (*Drosophila suzukii)*	Not developed	YES –TAS	YES – Viticulture[58], Cherry[59], Blueberry[60], Rubus[61], NSW DPI[62], Hort Innovation[63]	Not developed	Not categorised	YES – 3	Apple and Pear, Blueberry, Cherry, Rubus, Viticulture
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)							
Brown marmorated stink bug *(Halyomorpha halys)*	Not developed	YES – NSW, WA	YES – Tree nut industry[64], Cherry[65], NSW DPI[66]	YES – not industry specific[67]	Not categorised	YES – 10	Apple and Pear, Cherry, Nut, Rubus, Truffle, Vegetable
Glassy-winged sharpshooter (*Homalodisca vitripennis* with *Xylella fastidiosa*)	NDP 23[68]	YES – NSW, NT, SA, Tas, Vic, WA, Qld.	YES – Blueberry[69], Almond[70], Citrus[71], Nursery and Garden[72], Viticulture[73], Cherry[74]	Yes – Nursery and Garden[75]	Not categorised	YES – 1	Cherry, Citrus, Nursery and Garden, Viticulture, Blueberry

[58] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/11/Spotted-winged-drosophila-FS-Viticulture.pdf
[59] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Spotted-winged-drosophila-FS-Cherry.pdf
[60] http://www.planthealthaustralia.com.au/wp-content/uploads/2016/05/Spotted-winged-drosophila-FS-Blueberries.pdf
[61] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/09/Spotted-winged-drosophila-FS-Rubus.pdf
[62] https://www.dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/spottedwing-drosophila
[63] https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/spotted-wing-drosophila-host-list/
[64] http://www.planthealthaustralia.com.au/wp-content/uploads/2016/04/Brown-Marmorated-Stink-Bug-FS.pdf
[65] http://www.planthealthaustralia.com.au/wp-content/uploads/2019/05/Brown-marmorated-stink-bug-FS-cherries.pdf
[66] https://www.dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/brown-marmorated
[67] http://www.planthealthaustralia.com.au/wp-content/uploads/2018/09/Brown-marmorated-stink-bug-CP.pdf
[68] https://www.plantbiosecuritydiagnostics.net.au/app/uploads/2018/11/NDP-23-Glassy-winged-sharpshooter-Homalodisca-vitripennis-V1.2.pdf
[69] http://www.planthealthaustralia.com.au/wp-content/uploads/2016/05/Bacterial-leaf-scorch-sharpshooter-FS-Blueberries.pdf
[70] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Glassy-winged-sharpshooter-FS-Almond.pdf
[71] http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Glassy-winged-sharpshooter-FS-Citrus.pdf
[72] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Glassy-winged-sharpshooter-FS-Nursery-and-Garden.pdf
[73] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/11/Glassy-winged-sharpshooter-FS-Viticulture.pdf
[74] http://www.planthealthaustralia.com.au/wp-content/uploads/2019/05/Glassy-winged-sharpshooter-FS-cherries.pdf
[75] http://www.planthealthaustralia.com.au/wp-content/uploads/2017/11/Glassy-winged-sharp-shooter-CP-NG-2017.pdf

Common name (scientific name)	National diagnostic protocol[50]	Surveillance programs	Fact sheets	Contingency plan	EPPRD Category	National Priority Pest	Collaborators
LEPIDOPTERA (Butterflies and moths)							
Asian gypsy moth *(Lymantria dispar)*	Draft	YES – NSW, QLD, SA, TAS, VIC, WA	YES – Plantation forestry[76], Apple and Pear[77], Nursery and Garden[78]	YES – Nursery and Garden Industry[79]	Not categorised	YES – 6	Apple and Pear, Nursery and Garden, Nut, Plantation forest
PATHOGENS AND NEMATODES							
BACTERIA (including phytoplasmas)							
Phony disease of peach, plum leaf scald, Pierce's disease of grapevines, citrus variegated chlorosis (*Xylella fastidiosa)*	Endorsed (NDP 6)[80]	YES – NSW, NT, QLD, SA, TAS, VIC, WA	YES – Blueberries[81], Viticulture[82], Avocado[83], Almonds[84], Citrus[85] Cherry[86]	YES – Nursery and Garden Industry[87] and viticulture	2	YES – 1	Blueberry, Cherry, Viticulture, Coffee, Nut, Olive, Citrus Nursery and Garden

[76] http://www.planthealthaustralia.com.au/wp-content/uploads/2015/07/Gypsy-moth-FS-Plantation-forestry.pdf
[77] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Asian-gypsy-moth-FS-Apple-and-Pear.pdf
[78] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Asian-gypsy-moth-FS-Nursery-and-Garden.pdf
[79] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Gypsy-moth-CP-2009.pdf
[80] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-6-Pierces-disease-Xylella-fastidiosa-V1.2.pdf
[81] http://www.planthealthaustralia.com.au/wp-content/uploads/2016/05/Bacterial-leaf-scorch-sharpshooter-FS-Blueberries.pdf
[82] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/11/Pierces-disease-FS-Viticulture.pdf
[83] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Avocado-leaf-scorch-or-Pierces-disease-FS.pdf
[84] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Almond-leaf-scorch-or-Pierces-disease-FS.pdf
[85] http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Pierces-disease-Citrus-variegated-chlorosis-FS.pdf
[86] http://www.planthealthaustralia.com.au/wp-content/uploads/2019/05/Pierces-disease-FS-cherries.pdf
[87] http://www.planthealthaustralia.com.au/pests/xylella-fastidiosa/

Common name (scientific name)	National diagnostic protocol[50]	Surveillance programs	Fact sheets	Contingency plan	EPPRD Category	National Priority Pest	Collaborators
VIRUSES AND VIROIDS							
Sharka (*Plum pox virus*)	Endorsed (NDP 2)[88]	YES – Tas	YES – Cherry[89] and Summerfruit[90]	YES – Nursery and Garden Industry[91]	2	YES – 29	Cherry

[88] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-2-Plum-Pox-Virus-V3.1.pdf
[89] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Plum-pox-virus-FS-Cherry.pdf
[90] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Plum-pox-virus-FS-Summerfruit.pdf
[91] http://www.planthealthaustralia.com.au/pests/plum-pox-virus/

Summerfruit Australia Limited industry biosecurity statement

All EPPRD Parties are required under clause 13 of the EPPRD to produce a Biosecurity statement, the purpose of which is to provide acknowledgement of and commitment to risk mitigation measures and preparedness activities related to plant biosecurity. The Biosecurity statement will inform all Parties of activities being undertaken by the Industry Party to meet this commitment. Parties are required to report to PHA each year any material changes to the content of, or the Party's commitment to, the Party's Biosecurity statement. Biosecurity statements are included in *schedule 15 of the EPPRD*, which can be found on the PHA website at **www.planthealthaustralia.com.au/biosecurity/emergency-plant-pest-response-deed/**

NATIONAL BIOSECURITY SYSTEM

What is biosecurity and why is it important?

Plant biosecurity is a set of measures which protect the economy, environment and community from the negative impacts of plant pests. A fully functional and effective biosecurity system is a vital part of the future profitability, productivity and sustainability of Australia's plant production industries and is necessary to preserve the Australian environment and way of life.

Plant pests are insects, mites, snails, nematodes or pathogens (diseases) that have the potential to adversely affect food, fibre, ornamental crops, bees and stored products, as well as environmental flora and fauna. For agricultural systems, if exotic pests enter Australia they can reduce crop yields, affect trade and market access, significantly increase costs to production and in the worst-case scenario, bring about the complete failure of a production system. Historical examples present us with an important reminder of the serious impact that exotic plant pests can have on agricultural production.

Australia's geographic isolation and lack of shared land borders have, in the past, provided a degree of natural protection from exotic plant pest threats. Australia's national quarantine system also helps to prevent the introduction of harmful exotic threats to plant industries. However, there will always be some risk of an exotic pest entering Australia, whether through natural dispersal (such as wind) or assisted dispersal as a result of increases in international tourism, imports and exports, mail and changes to transport procedures (e.g. refrigeration and containerisation of produce).

The plant biosecurity system in Australia

Australia has a unique and internationally recognised biosecurity system to protect our plant production industries and the natural environment against new pests. The system is underpinned by a cooperative partnership between plant industries and all levels of government.

The framework for managing the cooperative partnership for delivering an effective plant biosecurity system is built on a range of strategies, policies and legislation, such as the

Intergovernmental Agreement on Biosecurity[92] and the National Plant Biosecurity Strategy[93]. These not only provide details about the current structure but provide a vision of how the future plant biosecurity system should operate.

Australia's biosecurity system has been subject to several reviews in recent times, with the recommendations recognising that a future-focused approach is vital for maintaining a strong and resilient biosecurity system that will protect Australia from new challenges. As a result, there is a continuous improvement from industry and governments to Australia's plant biosecurity system, with the key themes including:

- Targeting what matters most, including risk-based decision making and managing biosecurity risks across the biosecurity continuum (pre-border, border and post-border).
- Good regulation, including reducing regulatory burden and having effective legislation in place.
- Better processes, including service delivery modernisation with electronic, streamlined systems.
- Sharing the responsibility, including maintaining productive relationships with all levels of government, primary industries and the wider Australian public.
- Maintaining a capable workforce.

Through these themes, a focus on the biosecurity continuum better supports consistent service delivery offshore, at the border, and onshore, and provides an effective biosecurity risk management underpinned by sound evidence and technical justification.

The benefits of the modern biosecurity system are realised by industry, government and the community, with positive flow on effects to the economy more generally. This is through streamlined business processes, productivity improvements and reduced regulatory burden in a seamless and lower cost business environment, by emphasising risk-based decision making and robust partnerships.

Summerfruit Peak Industry Bodies

Summerfruit Australia Limited is the peak industry body for the summerfruit industry and the Canned Fruits Industry Council of Australia is the peak industry body for the canned fruits industry. They are both signatories to the EPPRD and are the key industry contact points if a suspect emergency plant pest affecting the summerfruit industry is detected. For further information about Summerfruit Australia Limited or the Canned Fruits Industry Council of

[92] For more information visit **https://www.agriculture.gov.au/biosecurity/partnerships/nbc/intergovernmental-agreement-on-biosecurity**
[93] For more information visit **www.planthealthaustralia.com.au/national-programs/national-plant-biosecurity-strategy/**

Australia in relation to response procedures following the identification of a suspect exotic pest refer to page 86. For a background on the summerfruit industry, refer to page 108.

Plant Health Australia

Plant Health Australia (PHA) is the national coordinator of the government-industry partnership for plant biosecurity in Australia.

PHA is a not-for-profit, subscription-funded public company based in Canberra. PHA's main activities are funded from annual subscriptions paid by members. The Australian Government, state and territory governments and 39 plant industry organisations are all members of PHA and each meet one third of the total annual membership subscription. This tripartisan funding model ensures the independence of the company.

The company was formed to address 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. Through PHA, current and future needs of the plant biosecurity system can be mutually agreed, issues identified, and solutions to problems found. PHA's independence and impartiality allow the company to put the interests of the plant biosecurity system first and support a longer-term perspective.

For more information about PHA visit **www.planthealthaustralia.com.au**

The Biosecurity Plan

The Biosecurity Plan for the Summerfruit Industry was developed in consultation with the Technical Expert Group (TEG) and Biosecurity Implementation Group (BIG), which consisted of plant health and biosecurity experts and industry representatives. These groups were coordinated by Plant Health Australia (PHA) and included representatives from Summerfruit Australia Limited, the Canned Fruits Industry Council of Australia, relevant state and territory agriculture agencies and PHA.

The biosecurity plan not only details exotic pest threats of the Australian summerfruit industry but also contains information on the 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 summerfruit industry.

This plan is a framework to coordinate biosecurity activities and investment for Australia's summerfruit industry and to address the 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 the summerfruit industry.

Biosecurity planning

Biosecurity planning provides a mechanism for the summerfruit industry, government and other relevant stakeholders to actively determine pests of highest priority, analyse the risks they pose and put in place practices and procedures that would rapidly detect an incursion, minimise the impact if a pest incursion occurs and/or reduce the chance of pests becoming established. Effective industry biosecurity planning relies on all stakeholders, including government agencies, industry, and the public (Figure 1).

Ensuring the summerfruit 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. The information gathered during these processes provides additional assurance that the Australian summerfruit industry is free from specific pests and has systems in place to control and manage biosecurity risks, which assists the negotiation of access to new overseas markets.

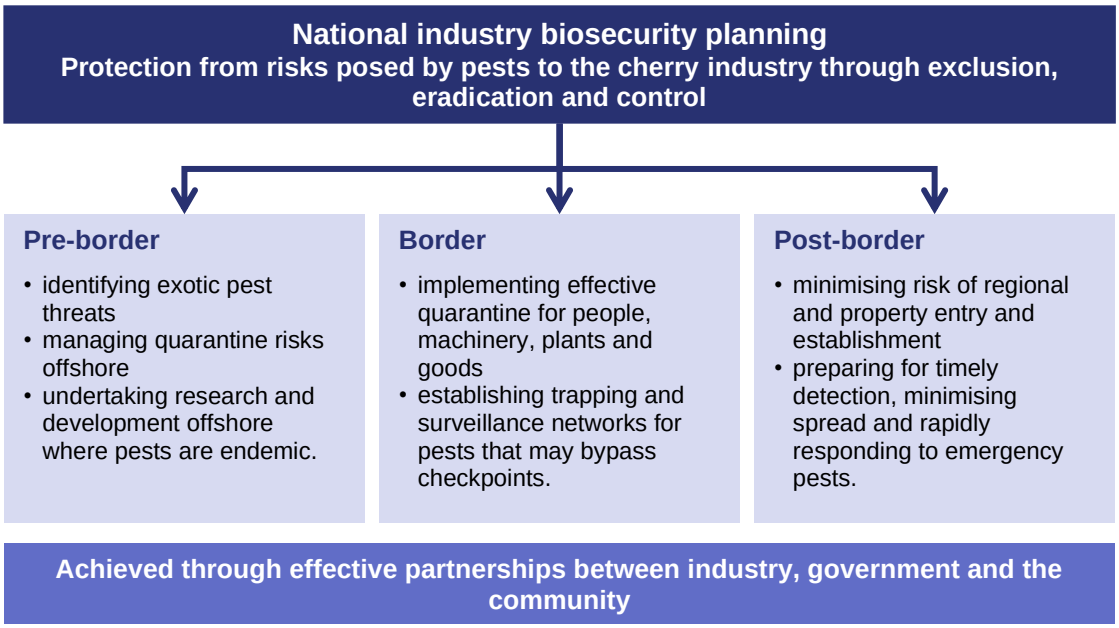

Figure 1. *Industry biosecurity: a shared responsibility.*

Biosecurity Plan development

With the assistance of Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia, a Technical Expert Group (TEG) and a Biosecurity Implementation Group (BIG) were formed to work on the review the Biosecurity Plan for the Summerfruit Industry (BP). These groups were coordinated by Plant Health Australia (PHA) and included representatives from Summerfruit Australia Limited, the Canned Fruits Industry Council of Australia, relevant state and territory agriculture agencies and PHA (Table 6 and Table 7).
Key roles of the technical expert group for the summerfruit BP included:

- identifying and documenting key threats to the summerfruit industry
- confirming an agreed high priority pest (HPP) list

Key roles of the biosecurity implementation group for the summerfruit BP included:

- documenting pest-specific fact sheets, contingency plans, diagnostic protocols and surveillance programs for HPPs
- documenting the roles and responsibilities of stakeholder groups.
- developing a biosecurity implementation table for future biosecurity related work to be conducted over the life of this biosecurity plan

Table 6. *Members of the Technical Expert Group and/or Biosecurity Implementation Group.*

Name	Organisation	Area of expertise	Member of Technical Expert Group	Member of Biosecurity Implementation Group
John Moore	Summerfruit Australia	Industry	✓	
Mark Wilkinson	Summerfruit Australia	Industry	✓	✓
Russell Fox	Industry	Agronomist	✓	✓
Mandy Christopher	QDAF	Risk Analysis	✓	✓
Liz Michinton	DJPR	Pathologist	✓	✓
Dave Williams	DJPR	Entomologist	✓	✓
Kyla Finlay	DJPR	Entomologist	✓	✓
Abu-Baker Siddique	QDAF	Pathologist	✓	
Nichole Hammond	DPIRD	Pathologist	✓	
Chris Pollard	The Canned Fruits Industry Council of Australia	Industry		✓
Victoria Ludowici	Plant Health Australia	Biosecurity	✓	
Rodney Turner	Plant Health Australia	Biosecurity		✓
Kathleen Deboer	Plant Health Australia	Biosecurity	✓	✓

Table 7. *Scientists and others who contributed information for review of the biosecurity plan.*[94].

Name	Organisation	Area of expertise
Mike Hodda	CSIRO	Nematology
Stacey Anderson	DA	Entomology
Wee Tek Tay	CSIRO	Entomology

Review processes

With the support of the relevant summerfruit industry bodies and PHA this plan should be reviewed on a 5-year basis. The review process will ensure:

- Threat Summary Tables are updated to reflect current knowledge
- pest risk assessments are current
- changes to biosecurity processes and legislation is documented
- contact details and the reference to available resources is accurate

In addition to the formal review process above, the document should be reviewed/revisited annually by a Biosecurity Reference Panel comprised of industry, government and PHA to ensure currency and relevance and to monitor progress with implementation. As an example, the industry biosecurity priorities identified within the plan could feed directly into industry R&D priority setting activities on an annual basis.

Opportunities to make out of session changes to the biosecurity plan, including the addition/subtraction of high priority pests or changes to legislation are currently being investigated. Such changes would need to include consultation and agreement of industry and government. This flexibility will facilitate the plan's currency and relevance.

[94] These people did not attend the technical expert group or biosecurity implementation group meetings but were approached for assistance during the biosecurity plan review process.

THREAT IDENTIFICATION AND PEST RISK ASSESSMENTS

Introduction

This section identifies high risk exotic pest threats to the summerfruit industry, and presents a framework for assessing the potential economic, social and environmental impacts associated with each threat. This part of the biosecurity plan uses a nationally consistent and coordinated approach to threat identification and risk assessment to provide a strong base for future risk management in the summerfruit industry.

By identifying key threats, a pre-emptive approach may be taken to risk management. Under this approach, mechanisms can be put into place to increase our response effectiveness if pest incursions occur. One such mechanism is the EPPRD that has been negotiated between PHA's government and industry members. The EPPRD ensures reliable and agreed funding arrangements are in place in advance of EPP incursions, and assists in the response to EPP incursions, particularly those identified as key threats.

Identification of high risk exotic pests will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers and diagnosticians, and development of pest-specific incursion response plans.

Established pests and weeds of biosecurity significance have also been listed in this plan. It is well understood that good biosecurity practice is beneficial for the ongoing management of established pests and weeds, as well as for surveillance and early detection of exotic pests. Established pests cause ongoing hardships for growers and these pests have been listed with the support of industry and government in recognition that they need a strategic, consistent, scientific and risk-based approach to better manage these pests for the summerfruit industry.

Exotic pests of the summerfruit industry

Threat identification

Information on exotic pest threats to the summerfruit industry described in this document came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment.

At this time, only invertebrate pests (insects, mites, molluscs and nematodes) and pathogens (disease causing organisms) have been identified, for risk assessment as these are what are responded to under national agreed arrangements, under the EPPRD. If exotic weeds were to be included in the EPPRD then this would be revisited through future reviews of the plan.

Pest risk assessments

The assessment process used in this BP was developed in accordance with the International Standards for Phytosanitary Measures (ISPM) No. 2 and 11 [Food and Agriculture Organization of the United Nations (FAO), 2004; 2007]. A summary of the pest risk analysis protocol followed in this BP is shown in Table 8, and the complete protocol used for pest risk analysis in this BP can be found on the PHA website[95].

While there are similarities in the ranking system used in this document and the Import Risk Analysis (IRA) process followed by the Department of Agriculture (DA), there are differences in the underlying methodology and scope of consideration that may result in different outcomes between the two assessment systems. This includes different guidance to assignment of qualitative probabilities when compared with DA's IRA process.

Modifications of the DA (Department of Agriculture Fisheries and Forestry, 2011) protocol have been made to suit the analysis required in the BP development process, including, but not limited to:

- **Entry potential:** The determination of entry potential in this BP takes into account multiple possible pathways for the legal importation of plant material as well as illegal

[95] Available from **www.planthealthaustralia.com.au/biosecurity/risk-mitigation**

pathways, contamination and the possibility of introduction through natural means such as wind. Therefore, the scope is wider than that used by the DA in their IRA process, which only considers legal importation of plants or plant commodities.

- **Potential economic impact** of pest establishment in this document only takes into account the impacts on the summerfruit industry. The DA IRA process has a wider scope, including the effects to all of Australia's plant industries, trade, the environment and public health.
- **Risk potentials and impacts:** The number of categories used in this BP for describing the entry, establishment, spread, and potential economic impact (see 'Description of terms used in pest risk tables', page 63) differs in comparison to that used in the DA Resources IRA process.

Table 8. *Summary of pest risk assessment process used in BPs.*

Step 1	Clearly identify the pest	• Generally, pest defined to species level • Alternatively, a group (e.g. family, genus level) can be used • Sub-species level (e.g. race, pathovar, etc.) may be required
Step 2	Assess entry, establishment and spread likelihoods	• Assessment based on current system and factors • Negligible, low, medium, high or unknown ratings
Step 3	Assess likely consequences	• Primarily based on likely economic impact to industry based on current factors • Negligible, low, medium, high, extreme or unknown ratings
Step 4	Derive overall risk	• Entry, establishment and spread likelihoods are combined to generate a likelihood score • Likelihood score combined with the likely economic impact to generate an overall risk score
Step 5	Review the risk	• Risk ratings should be reviewed with the BP

The objective of risk assessment is to clearly identify and classify biosecurity risks and to provide data to assist in the evaluation and treatment of these risks. Risk assessment involves consideration of the sources of risk, their consequences, and the likelihood that those consequences may occur. Factors that affect the consequences and likelihood may be identified and addressed via risk mitigation strategies.

Risk assessment may be undertaken to various degrees of refinement, depending on the risk information and data available. Assessment may be qualitative, semi-quantitative, quantitative, or a combination of these. The complexity and cost of assessment increase with the production of more quantitative data. It is often more practical to first obtain a general indication of the level of risk through qualitative risk assessment, and if necessary, undertake more specific quantitative assessment later [Australian Standard/New Zealand Standard (AS/NZS) ISO 31000, 2009].

Ranking pest threats

Key questions required for ranking the importance of pests include the following:

- What are the probabilities of entry into Australia, establishment and spread, for each pest?
- What are the likely impacts of the pest on cost of production, overall productivity and market access?
- How difficult is each pest to identify and control and/or eradicate?

The TSTs (Appendix 2: Threat Summary Tables) present a list of potential plant pest threats to the summerfruit industry and provide summarised information on entry, establishment and spread potential, the economic consequences of establishment and eradication potential (where available). The most serious threats from the TSTs were identified through a process of qualitative risk assessment[96] and are listed in the HPP list (Table 1).

This document considers all potential pathways by which a pest might enter Australia, including natural and assisted spread (including smuggling). This is a broader view of potential risk than the IRA conducted by the Department of Agriculture which focus only on specific regulated import pathways.

When a pest that threatens multiple industries is assessed, the entry, establishment and spread potentials take into account all known factors across all host industries. This accurately reflects the ability of a pest to enter, establish and spread across Australia and ultimately results in different industries, and their BPs, sharing similar pest ratings. However, the economic impact of a pest is considered at an industry specific level (i.e. for the summerfruit industry only in this BP), and therefore this rating may differ between BPs.

[96] An explanation of the risk assessment method used can be found on the PHA website (**www.planthealthaustralia.com.au/biosecurity/risk-mitigation**)

Description of terms used in pest risk tables

The descriptions below relate to terms in Table 1 and elsewhere in the document.

Entry potential

Negligible	The probability of entry is extremely low given the combination of all known factors including the geographic distribution of the pest, quarantine practices applied, probability of pest survival in transit and pathways for pest entry and distribution to a suitable host.
Low	The probability of entry is low, but clearly possible given the expected combination of factors described above.
Medium	Pest entry is likely given the combination of factors described above.
High	Pest entry is very likely and potentially frequent given the combination of factors described above.
Unknown	The pest entry potential is unknown or very little of value is known.

Establishment potential

Negligible	The pest has limited potential to survive and become established within Australia given the combination of all known factors.
Low	The pest has the potential to survive and become established in approximately one-third or less of the range of hosts. The pest could have a low probability of contact with susceptible hosts.
Medium	The pest has the potential to survive and become established in between approximately one-third and two-thirds of the range of hosts.
High	The pest has potential to survive and become established throughout most or all of the range of hosts. Distribution is not limited by environmental conditions that prevail in Australia. Based upon its current world distribution, and known conditions of survival, it is likely to survive in Australia wherever major hosts are grown.
Unknown	The establishment potential of the pest is unknown or very little of value is known.

Spread potential

Negligible	The pest has very limited potential for spread in Australia given the combination of dispersal mechanisms, availability of hosts, vector presence, industry practices and geographic and climatic barriers.
Low	The pest has the potential for natural or assisted spread to susceptible hosts within Australia yet is hindered by a number of the above factors
Medium	The pest has an increased likelihood of spread due to the above factors
High	The natural spread of the pest to most production areas is largely unhindered and assisted spread within Australia is also difficult to manage
Unknown	The spread potential is unknown or very little of value is known.

Economic impact

Negligible	There are very minor, often undetectable, impacts on production with insignificant changes to host longevity, crop quality, production costs or storage ability. There are no restrictions to market access.
Very low	There are minor, yet measurable, impacts on production including either host longevity, crop quality, production costs or storage ability. There are no restrictions to market access.
Low	There are measurable impacts to production including either host mortality, reduction in yield, production costs, crop quality, storage losses, and/or minimal impacts on market access.
Medium	There are significant impacts on production with either host mortality, reduction in yield, production costs, crop quality, storage losses, and/or moderate impacts on market access.
High	There are severe impacts on production including host mortality and significant impacts on either crop quality or storage losses, and/or severe impacts on market access.
Extreme	There is extreme impact on standing crop at all stages of maturity, with high host mortality or unmanageable impacts to crop production and quality, and /or extreme, long term, impacts on market access.
Unknown	The economic potential of the pest is unknown or very little of value is known.

References

AS/NZS ISO 31000:2009 Risk management - Principles and guidelines. Standards Australia, Sydney, and Standards New Zealand, Wellington.

DAFF (2011) Import Risk Analysis Handbook 2011. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

FAO (2004) Pest risk analysis for quarantine pests including analysis or environmental risks and living modified organisms. International Standards for Phytosanitary Measures No. 11. Secretariat of the International Plant Protection Convention, Food and Agriculture Organization of the United Nations, Rome.

FAO (2007) Framework for pest risk analysis. International Standards for Phytosanitary Measures No. 2. Secretariat of the International Plant Protection Convention, Food and Agriculture Organization of the United Nations, Rome.

RISK MITIGATION AND PREPAREDNESS

Introduction

There are a number of strategies that can be adopted to help protect and minimise the risks of Emergency Plant Pests under International Plant Protection Convention (IPPC) standards (**www.ippc.int/standards**) and Commonwealth and State/Territory legislation.

Many pre-emptive practices can be adopted to reduce the risk of exotic pest movement for the summerfruit industry (Figure 2). Such risk mitigation and preparedness practise are the responsibility of governments, industry and the community.

A number of key risk mitigation areas are outlined in this guide, along with summaries of the roles and responsibilities of the Australian Government, state/territory governments, and summerfruit industry members. This section is to be used as a guide outlining possible activities that may be adopted by industry and growers to mitigate the risk and prepare for an incursion response. Each grower will need to evaluate the efficacy of each activity for their situation.

Figure 2. *Examples of biosecurity risk mitigation activities.*

Barrier quarantine

Barrier quarantine refers to the biosecurity measures implemented at all levels of the summerfruit industry including national, state, regional, and farm levels.

National level – importation restrictions

The Department of Agriculture (DA) is the Australian Government department responsible for maintaining and improving international trade and market access opportunities for agriculture, fisheries, forestry, and food industries. DA achieves this through:

- establishment of scientifically-based quarantine policies
- provision of effective technical advice and export certification services
- negotiations with key trading partners
- participation in multilateral forums and international sanitary and phytosanitary (SPS) standard-setting organisations
- collaboration with portfolio industries and exporters.

DA is responsible for developing biosecurity (SPS) risk management policy and reviewing existing quarantine measures for the importation of live animals and plants, and animal and plant products. In particular, DA undertakes import risk analyses to determine which products may enter Australia, and under what quarantine conditions. DA also consults with industry and the community, conducting research and developing policy and procedures to protect Australia's animal and plant health status and natural environment. In addition, DA assists Australia's export market program by negotiating other countries' import requirements for Australian animals and plants. Further information can be found at **www.agriculture.gov.au**.

The administrative authority for national quarantine is vested in DA under the *Biosecurity Act 2015*. Quarantine policies are developed on the basis of an IRA process. This process is outlined in the IRA Handbook 2011 (Department of Agriculture, Fisheries and Forestry, 2011). DA maintains barrier quarantine services at all international ports and in the Torres Strait region. The management of quarantine policy, as it relates to the introduction into Australia of fruit, seed, or other plant material, is the responsibility of DA.

BICON contains the current Australian import conditions for more than 20,000 foreign plants, animal, mineral and human products and is the first point of access to information about Australian import requirements for a range of commodities. It can be used to determine if a commodity intended for import to Australia requires a quarantine import permit and/or

treatment or if there are any other quarantine prerequisites. There are currently a number of cases for summerfruit listed on BICON (Table 9). For export conditions see the Manual of Importing Country Requirements (MICoR) database at **https://micor.agriculture.gov.au/plants/**.

The Australian Government is responsible for the inspection of machinery and equipment being imported into Australia. Any machinery or equipment being imported into Australia must meet quarantine requirements. If there is any uncertainty, contact DA on (02) 6272 3933 or 1800 020 504, or visit the website at **https://www.agriculture.gov.au/import**

The World Trade Organization (WTO) SPS Agreement facilitates international trade while providing a framework to protect the human, animal and plant health of WTO members. SPS measures put in place must minimise negative effects on trade while meeting an importing country's appropriate level of protection. For plant products, these measures are delivered through the IPPC standard setting organisations and collaboration with portfolio industries and exporters. For more information on the IPPC visit **www.ippc.int**.

Table 9. *Product types for which import conditions are listed in BICON (as at January 2019).*[97]

Crop	Product type
Peaches	Fresh stone fruit for human consumption
	Dried fruit
	Prunus spp. for use as nursery stock
	Prunus spp. seed for sowing
	Tea for human consumption
	Preserved fruit and vegetables for human consumption
Apricots	Dried apricot kernels
	Raw nuts for human consumption
	Frozen fruit, vegetables and herbs for human consumption
	Dried fruit
	Prunus spp. for use as nursery stock
	Prunus spp. seed for sowing
	Fresh stone fruit for human consumption
	Dried herbs for human consumption
	Dried herb products not for human consumption
	Cosmetic and soaps

[97] Please note, this is a summary only. Conditions change overtime and BICON (**www.agriculture.gov.au/import/bicon**), or the Department of Agriculture will need to be consulted to confirm the specific conditions that apply to a given situation.

Crop	Product type
Nectarines	*Prunus* spp. seed for sowing
	Fresh stone fruit for human consumption
	Dried fruit
Plums	Fresh stone fruit for human consumption
	Dried fruit
	Dried herbs for human consumption
	Dried herb products not for human consumption
	Prunus spp. for use as nursery stock
	Prunus spp. seed for sowing
	Preserved fruit and vegetables for human consumption

State and regional level – movement restrictions

The ability to control movement of materials that can carry and spread summerfruit pests is of high importance. Each state/territory has quarantine legislation in place to control the importation of summerfruit material interstate and intrastate, and to manage agreed pests if an incursion occurs (Table 10). Further regulations have been put in place in response to specific pest threats and these are regularly reviewed and updated by state/territory authorities and the Sub-Committee for Domestic Quarantine and Market Access (SDQMA).

Moving plant material between states/territories generally requires permits from the appropriate authority, depending on the plant species and which territory/state the material is being transferred to/from. Moving plant material intrastate may also require a permit from the appropriate authority. Information on pre-importation inspection, certification and treatments and/or certification requirements for movement of summerfruit can be obtained by contacting your local state or territory agriculture department directly (Table 10), or through the SDQMA website **https://www.interstatequarantine.org.au/** which lists relevant contacts in each state/territory as well as Interstate Certification Assurance (ICA) documents relating to each state/territory.

The movement of farm vehicles and equipment between states is also restricted because of the high risk of inadvertently spreading pests. Each state/territory has quarantine legislation in place governing the movement of machinery, equipment and other potential sources of pest contamination. Further information can be obtained by contacting your local state/territory Department of Agriculture (Table 10).

Table 10. *Interstate and interregional movement of plant products – legislation, quarantine manuals and contact numbers.*

State	Administering authority	Legislation	Links to quarantine manual	Phone
ACT	Environment ACT **www.environment.act.gov.au**	*Plant Disease Act 2002* *Pest Plants and Animals Act 2005*	See NSW conditions	13 22 81
NSW	Department of Primary Industries **www.dpi.nsw.gov.au**	*Biosecurity Act 2015* *Biosecurity Regulation 2017* *Biosecurity Order (Permitted Activities) 2017* and other supporting legislation such as Control Orders	**dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases**	02 6391 3384
NT	Department of Primary Industry and Fisheries **www.dpir.nt.gov.au**	*Plant Health Act 2008* *Plant Health Regulations 2011*	**nt.gov.au/industry/agriculture/food-crops-plants-and-quarantine/plants-and-quarantine**	08 8999 2118
QLD	Biosecurity Queensland, a part of the Department of Agriculture and Fisheries, Queensland **www.daf.qld.gov.au/biosecurity**	*Biosecurity Act 2014* *Biosecurity Regulation 2016*	**www.daf.qld.gov.au/plants/moving-plants-and-plant-products**	132 523[98] 07 3404 6999[99]
SA	Primary Industries and Regions SA **www.pir.sa.gov.au**	*Plant Health Act 2009* *Plant Health Regulations 2009*	**www.pir.sa.gov.au/biosecurity/plant_health/importing_commercial_plants_and_plant_products_into_south_australia**	08 8207 7820
TAS	Department of Primary Industries, Parks, Water and Environment **www.dpipwe.tas.gov.au**	*Plant Quarantine Act 1997* *Weed Management Act 1999*	**dpipwe.tas.gov.au/biosecurity-tasmania/plant-biosecurity/plant-biosecurity-manual**	1300 368 550
VIC	Department of Jobs, Precincts and Regions **https://djpr.vic.gov.au**	*Plant Biosecurity Act 2010* *Plant Biosecurity Regulations 2016*	**agriculture.vic.gov.au/psb**	136 186
WA	Department of Primary Industries and Regional Development **www.agric.wa.gov.au**	*Biosecurity and Agricultural Management Act 2007*		08 9334 1800

[98] Within Qld

[99] Interstate

New South Wales

Information on pre-importation inspection, certification and treatment requirements may be obtained from NSW DPI Regulatory Services by phone 02 6391 3384 or by visiting the NSW Department of Primary Industries website **www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases**.

Northern Territory

Administrative authority for regional quarantine in the Northern Territory (NT) is vested in the Department of Primary Industry and Resources (DPIR) under the *Plant Health Act 2008* and *Plant Health Regulations 2011*. The Act enables notifiable pests to be gazetted, quarantine areas to be declared and inspectors appointed to carry out wide ranging control and/or eradication measures. Plant import requirements for particular pests, plants or plant related materials are identified in the Regulations. Further information on NT import requirements and treatments can be obtained by contacting NT Quarantine on (08) 8999 5511 or email **quarantine@nt.gov.au**.

For more information refer to the DPIR website (**https://dpir.nt.gov.au/**).

Queensland

Information on specific pre-importation inspection, treatments and/or certification requirements for movement of any fruit or plant material into Queensland, as well as maps of pest quarantine areas, may be obtained from the Biosecurity Queensland part of the DAF Queensland website (**www.daf.qld.gov.au/plants/moving-plants-and-plant-products**).

Further details can be obtained from the DAF Queensland Customer Service Centre (13 25 23 within Queensland, or phone 07 3404 6999 or fax 07 3404 6900 interstate).

South Australia

Information on pre-importation inspection, certification and treatments and/or certification requirements for movement of fruit or plant material in South Australia (SA) may be obtained from Biosecurity SA - Plant Health by phone (08) 8207 7820 or fax (08) 8207 7844. Further information can be found at **www.pir.sa.gov.au/biosecurity/plant_health**.

Primary Industries and Regions South Australia (PIRSA) have strict regulations and requirements regarding the entry of plant material (fruit, vegetables, flowers, plants, soil and seeds) into the State.

For further information on import conditions consult the Plant Quarantine Standard (**www.pir.sa.gov.au/biosecurity/plant_health/importing_commercial_plants_and_plant_products_into_south_australia**).

Tasmania

Information on specific pre-importation inspection, treatments and/or certification requirements for movement of any fruit or plant material into Tasmania may be obtained from the Department of Primary Industries, Parks, Water and Environment (DPIPWE) Biosecurity website (**www.dpipwe.tas.gov.au/biosecurity**) or by phoning 1300 368 550.

General and specific import conditions apply to the importation of plant material into Tasmania to prevent the introduction of pests and diseases into the State. Plants and plant products must not be imported into Tasmania unless State import requirements are met and a Notice of Intention to import has been provided to a Biosecurity Tasmania inspector not less than 24 hours prior to the importation.

For further information on import conditions consult the Plant Quarantine Manual (**https://dpipwe.tas.gov.au/biosecurity-tasmania/plant-biosecurity/plant-biosecurity-manual**).

Victoria

The movement into Victoria of plants and plant products may be subject to a prohibition, or to one or more conditions which may include chemical treatments. These prohibitions and conditions are described on the Department of Jobs, Precincts and Regions (DJPR) website (see link in Table 11). Some items may need to be presented to a DJPR inspector or an accredited business, for checking of details such as correct certification, labelling or treatment.

Further information on pre-importation inspection, certification and treatments and/or certification requirements for movement of fruit or plant material into or within Victoria may be obtained from DJPR on the web at **www.agriculture.vic.gov.au/psb** or by phone 136 186.

Western Australia

The lead agency for agricultural biosecurity in Western Australia is the Department of Primary Industries and Regional Development (WA DPIRD). Western Australia is naturally free from a large number of pests and diseases that are present in many other parts of the world. WA's geographical isolation in conjunction with a robust plant biosecurity system including border and intrastate regulations, industry and public awareness campaigns and surveillance programs maintains this status.

There are general and specific legislative requirements which underpin Western Australian plant biosecurity. Amongst other things the legislation regulates movement of potential carriers (such as plant material, honey, machinery, seeds etc.) into and within the state.

General conditions include (but are not limited to the following):

- The requirement for all potential carriers to be presented to an inspector for inspection upon arrival in WA
- Soil is prohibited entry and imported goods, including containers, must be free from soil
- Freedom from pests and diseases of quarantine concern to WA

In addition to the general requirements, specific requirements are also in place for movement into and within the state.

For further information on requirements contact Quarantine WA on (08) 9334 1800 or fax (08) 9334 1880.

Farm level – exclusion activities

A significant risk of spreading pests onto farms arises when propagation material, people, machinery and equipment move from property to property and from region to region. It is the responsibility of the industry and the owner/manager of each property to ensure these risks are minimised.

It is in the interests of industry to encourage and monitor the management of risk at the farm level, as this will reduce the probability of an incursion and increase the probability of early detection. This should in turn reduce the likelihood of a costly incident response, thereby reducing costs to industry, government and the community.

One major way this can be achieved is through management of industry biosecurity at the farm level using exclusion practices. Further detail on potential strategies is included in the Farm Biosecurity section (page 85). The summerfruit industry is already a strong supporter of farm biosecurity; but should continue to further extend this message of promoting good farm hygiene in a wide range of ways.

Surveillance

Surveys enhance prospects for early detection, minimise costs of eradication and are necessary to meet the treaty obligations of the WTO SPS Agreement with respect to the area freedom status of Australia's states, territories and regions.

The SPS Agreement gives WTO members the right to impose SPS measures to protect human, animal and plant life health provided such measures do not serve as technical barriers to trade. In other words, for countries (such as Australia) that have signed the SPS Agreement, imports of food, including fresh fruit and summerfruit, can only be restricted on

proper, science-based quarantine grounds. Where quarantine conditions are imposed, these will be the least trade restrictive measures available that meet Australia's appropriate level of quarantine protection. The Agreement also stipulates that claims of area freedom must be supported by appropriate information, including evidence from surveillance and monitoring activities. This is termed "evidence of absence" data and is used to provide support that we have actively looked-for pests and not found them.

ISPM 6 (**www.ippc.int/sites/default/files/documents/20140528/spec_61_revispm6_2014-05-28_201405281352--150.18%20KB.pdf**) provides international guidelines for structured pest surveys. Structured pest survey planning and implementation depends on the risk involved, the resources available, and the requirements of trading partners (particularly when Australia wishes to access overseas markets). The intensity and timing of surveys also depend on the spread characteristics of the pest and the costs of eradication.

Early detection of an exotic incursion can significantly increase the likelihood of a successful eradication campaign and reduce the associated costs. Effective surveillance plays a critical role in working toward this goal. Surveillance can be either targeted toward specific pests, or general in nature. General non-targeted surveillance is based on recognising normal versus suspect plant material. Targeted surveillance is important for establishing whether particular pests are present in each state or region, and if so, where these occur.

Industry personnel can provide very effective early detection of new or unusual symptoms through their normal management practices (i.e. 'passive surveillance'), provided individuals are aware of what to look for and of reporting procedures. Consultants and crop scouts can provide valuable information as they are regularly in the field, and hence can observe any unusual pest activity or symptoms on plants.

National surveillance programs

The Department of Agriculture (DA) maintains barrier quarantine services at all international ports and in the Torres Strait region. DA also surveys the northern coast of Australia, offshore islands and neighbouring countries for exotic pests that may have reached the country through other channels (e.g. illegal vessel landings in remote areas, bird migrations, wind currents) as part of the Northern Australia Quarantine Strategy (NAQS). NAQS surveillance programs relevant to the summerfruit industry are listed in Table 11.

State surveillance programs

State level surveillance depends on the participation of all stakeholder groups, particularly state/territory agriculture departments, industry representative groups, agri-business and growers.

The state/territory agriculture department can provide:

- planning and auditing surveillance systems
- coordination of surveillance activities between industry and interstate groups
- diagnostic services
- field diagnosticians for special field surveillance
- surveillance on non-commercial sites
- liaison services with industry members
- communication, training and extension strategies with industry
- biosecurity training
- reporting services to all interested parties (Department of Agriculture, national bodies, trading partners and industry).

Various pest surveillance programs are managed by the Department of Agriculture and the state/territory agriculture departments. Many state/territory departments run general surveillance programs whereby suspect samples can be forwarded and diagnosed for the presence of exotic pests free of charge. Official surveillance programs that target pests of the summerfruit industry (exotic or those under official control in a region or state/territory) are shown in Table 11.

Table 11. *Official surveillance programs that target pests of the summerfruit industry (as at January 2019).*[100]

Surveillance program	Pests targeted	Hosts targeted
Australian Government		
Northern Australia Quarantine Strategy exotic fruit fly trapping	Exotic fruit flies (*Bactrocera* spp.), Bayberry fly (*Parabemisia myricae*), Comstock's mealybug (*Pseudococcus comstocki)*	Horticulture
New South Wales		
National Plant Health Surveillance Program	Glassy winged sharpshooter (*Homalodisca vitripennis*), Pierce's disease (*Xylella fastidiosa*), fire blight (*Erwinia amylovora*), brown marmorated stink bug (*Halyomorpha halys*), exotic mites (including *Brevipalpus* spp., *Aceria granati*), exotic leaf miners (*Liriomyza* spp.)	Multiple plant and weed hosts in the Sydney basin

[100] Information presented has been taken from the National Plant Health Status Report 2017

Surveillance program	Pests targeted	Hosts targeted
Onion seed crop surveillance	Varies but may include *Burkholderia gladioli* pv. *alliicola*, *Erwinia chrysanthemi*, *Alternaria porri*, *Pyrenochaeta terrestris*, *Urocystis cepulae*, *Ceratitis* spp. *Helix aspersa*, *Liriomyza trifolii*, *Naupactus leucoloma*, *Aphelenchoides fragariae*, *Ditylenchus destructor*, *D. dipsaci*, *Longidorus* spp., *Meloidogyne goeldi*, *Paratrichodorus* spp., *Pratylenchus filipjev*	Onions
Exotic fruit flies – ports	Multiple – *Bactrocera cucurbitae, B. tau*, *B. carambolae*, *B. dorsalis*, *B. albistrigata*, *B. umbrosa*, *B. trivialis*, *B. facialis*, *B. kirki*, *B. melanotus*, *B. passiflorae**, *B. xanthodes*, *B. psidii*, *B. zonata*, *Ceratitis capitata*	Various production and ornamental plants
Exotic fruit flies – Riverina	Mediterranean fruit fly (*Ceratitis capitata*), papaya fruit fly (*Bactrocera papayae**), various cue lure attracted exotic fruit flies	Various horticultural crops (citrus, stone fruit)
Brown marmorated stink bug	Brown marmorated stink bug (*Halyomorpha halys*)	Multiple tree and crop hosts
Northern Territory		
National Plant Health Surveillance Program	Pierce's disease (*Xylella fastidiosa*)	Multiple
National Plant Health Surveillance Program	Glassy winged sharpshooter (*Homalodisca vitripennis*)	Multiple
National Plant Health Surveillance Program – Port of Entry Program	Exotic fruit flies (*Bactrocera* spp. and *Ceratitis* spp.)	Horticulture
Regional Fruit Fly Monitoring and Surveillance	Exotic fruit flies (*Bactrocera* spp. and *Ceratitis* spp.)	Horticulture
Queensland		
Grow Help Australia diagnostic service project	All pests and pathogens that can affect horticultural crops, national parks, gardens, hobby growers and home gardeners. Commonly encountered pathogens include *Phytophthora* spp., *Fusarium* spp., *Colletotrichum* spp., *Alternaria* spp., *Rhizoctonia* spp., *Pythium* spp., *Ralstonia* spp., *Erwinia* spp. and viruses	Fruit, vegetable and ornamental
Exotic Fruit Fly in the Torres Strait Program	Exotic fruit fly including *Bactrocera* and *Zeugodacus* spp.	Multiple
National Plant Health Surveillance Program	A range of exotic timber and forest pests, including sugarcane longhorn beetle (*Dorysthenes buqueti*), Asian and citrus longhorn beetle (*Anoplophora* spp.), lychee longicorn beetle (*Aristobia testudo*), lateral-banded mango longhorn beetle (*Batocera rubus*), sawyer beetles (*Monochamus* spp.), drywood longicorn beetle (*Stromatium barbatum*), ambrosia beetles, bark beetles (*Ips* spp.), pine beetles bark beetles (*Dendroctonus* spp.), wood wasps (Siricid wasps e.g. *Uroceris gigas*). Exotic fruit flies (*Bactrocera* spp., *Zeugodacus* spp. and *Ceratitis* spp.), gypsy moths (*Lymantria* spp.), Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Multiple

Surveillance program	Pests targeted	Hosts targeted
South Australia		
National Plant Health Surveillance Program	Huanglongbing (*Candidatus* Liberibacter asiaticus), citrus canker (*Xanthomonas axonopodis* pv. citri), citrus variegated chlorosis (*Xylella fastidiosa*)	Rutaceae
National Plant Health Surveillance Program	Olive quick decline (*Xylella fastidiosa*)	Oleaceae
National Plant Health Surveillance Program	Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	*Vitus vinifera*
National Plant Health Surveillance Program	Glassy winged sharpshooter (*Homalodisca vitripennis*), African citrus psyllid (*Trioza erytreae*), Asian citrus psyllid (*Diaphorina citri*)	Rutaceae
Ports of Entry Trapping Program	Fruit flies (*Bactrocera* spp. and *Ceratitis* spp.)	Fruit fly host
Ports of Entry Trapping Program	Exotic gypsy moths (*Lymantria* spp.)	*Eucalyptus* spp., ornamental trees
Tasmania		
Multiple Pest Surveillance Program 2017–18 – Pierce's disease	Pierce's disease (*Xylella fastidiosa*)	Nurseries, urban pathways
Multiple Pest Surveillance Program 2017–18 – sharka	Sharka (plum pox virus)	Commercial orchards
Multiple Pest Surveillance Program 2017–18 – glassy winged sharpshooter	Glassy winged sharpshooter (*Homalodisca vitripennis)*	Nurseries, urban pathways
Fruit fly trapping surveillance	*Bactrocera tryoni, Ceratitis capitata, Bactrocera dorsalis* and other exotic fruit flies	Host fruit trees, fruit and vegetables
Multiple Pest Surveillance Program 2017–18 – spotted wing Drosophila	Spotted wing drosophila (*Drosophila suzukii)*	Urban pathways
Victoria		
National Plant Health Surveillance Project	Fruit and vegetable crops	Plants and weed hosts around Victorian ports
National Plant Health Surveillance Project	Fruit and vegetable crops	Fruit flies (*Bactrocera* spp.)
National Plant Health Surveillance Project	Pierces's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Grapes
National Plant Health Surveillance Project	Pierces's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Grapes
National Plant Health Surveillance Project	*Grapholita prunivora* (syn. *Cydia prunivora)*	Plants and weed hosts around Melbourne ports

Surveillance program	Pests targeted	Hosts targeted
Western Australia		
Multiple pest surveillance	Fire blight (*Erwinia amylovora*), huanglongbing (*Candidatus* Liberibacter asiaticus), citrus canker (*Xanthomonas axonopodis* pv. *citri*), citrus longicorn beetle (*Anoplophora chinensis*), red imported fire ants (*Solenopsis invicta*), Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Pome and citrus crops
Port of Entry – fruit fly trapping	Various *Bactrocera* spp. and *Ceratitis* spp.	Many horticultural hosts
Brown marmorated stink bug	*Halyomorpha halys*	General surveillance, all hosts, urban areas

Farm surveillance activities

Farm level surveillance involves the participation and interaction of growers, agribusiness and industry representative groups. Examples of the surveillance activities that can be carried out by each of these groups are outlined in Figure 3. Conducting regular surveys of farms and nurseries provides the best chance of spotting new pests early and implementing eradication or management responses.

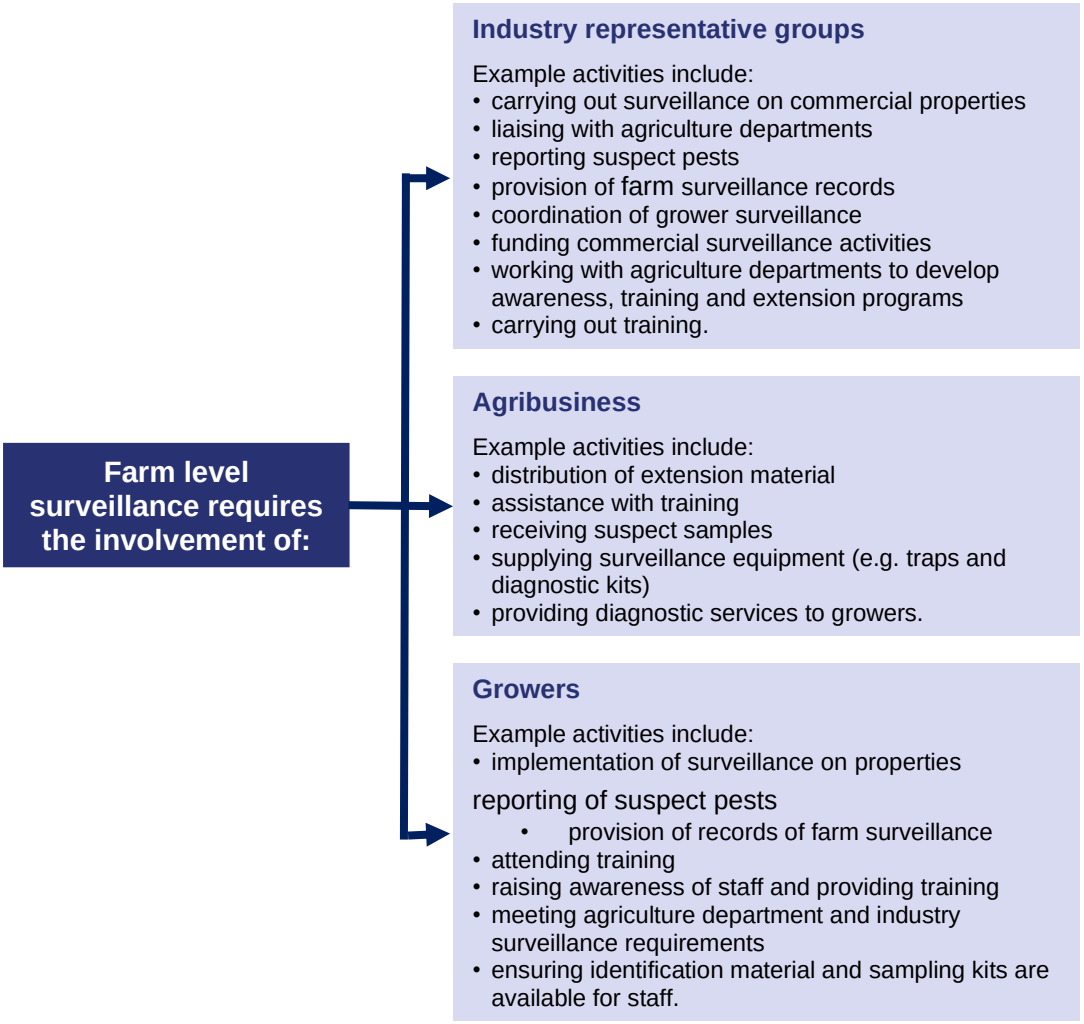

Figure 3. *Examples of farm level surveillance activities.*

Training

A key component of biosecurity preparedness is ensuring personnel engaged are suitable and effectively trained for their designated roles in a response. Biosecurity preparedness training is the responsibility of all governments and industries, involved in the biosecurity system.

National EPP Training Program

PHA supports members in training personnel through the delivery of the National EPP Training Program. This program is focussed on ensuring personnel from the governments and

peak industry bodies who will be involved in responses to EPPs have the skills and knowledge to effectively fulfil the roles and responsibilities of their parties, as signatories to the EPPRD. This covers a range of areas, from representatives on the national decision-making committees (i.e. the Consultative Committee on Emergency Plant Pests and the National Management Group) through to industry liaison personnel in the State Coordination or Local Control Centres.

In addition to face to face training delivered to members and the provision of simulation exercises, PHA also offers biosecurity training through the Biosecurity OnLine Training (BOLT) platform which houses a variety of eLearning courses relevant to plant biosecurity. Access to BOLT is free and open to any stakeholder interested in biosecurity and is available through **www.planthealthaustralia.com.au/bolt**.

For more information on the National EPP Training program, refer to **www.planthealthaustralia.com.au/training**.

Awareness

Early reporting enhances the chance of effective control and eradication. Awareness activities raise the profile of biosecurity and exotic pest threats to the summerfruit industry, which increases the chance of early detection and reporting of suspect pests. Responsibility for awareness material lies with industry and government, with assistance from PHA as appropriate. Any unusual plant pest should be reported immediately to the relevant state/territory agriculture department through the Exotic Plant Pest Hotline (1800 084 881).

High priority plant pest threat-related documents

Pests listed in Table 1 have been identified as high priority threats to the summerfruit industry by members of the TEG. They have been assessed as having high entry, establishment and spread potentials and/or a high economic impact. This list should provide the basis for the development of awareness material for the industry.

Further information on high priority pests

The websites listed below (Table 12) contain information on pests across most plant industries, including the summerfruit industry.

Table 12. *Sources of information on high priority pest threats for the summerfruit industry.*

Source	Website
CABI – Crop Protection Compendium	**https://www.cabi.org/cpc/**
DAF Queensland A-Z list of significant plant pests and diseases	**www.daf.qld.gov.au/plants/health-pests-diseases/a-z-significant**
Department of Agriculture	**www.agriculture.gov.au**
European and Mediterranean Plant Protection Organization (EPPO)	**www.eppo.int/DATABASES/pqr/pqr.htm**
Pest and Disease Image Library (PaDIL)	**http://www.padil.gov.au/**
University of California Statewide Integrated Pest Management (IPM) Program	**www.ipm.ucdavis.edu/EXOTIC/exoticpestsmenu.html**

Further information/relevant web sites

A range of government and grower organisation details and websites for persons seeking further information on summerfruit industry biosecurity (Table 13).

Table 13. *Relevant sources of further biosecurity information for the summerfruit industry.*

Agency	Website/email	Phone	Address
National			
Summerfruit Australia Limited	**https://summerfruit.com.au/**	(02) 6059 0816	P.O. Box 1726, Wodonga, Victoria 3689
The Canned Fruits Industry Council of Australia	**http://fgv.com.au/**	(03) 5833 3786	PO Box 612, Mooroopna, Victoria 3629
Department of Agriculture	**www.agriculture.gov.au**	(02) 6272 3933 1800 020 504	GPO Box 858 Canberra, ACT 2601
Plant Health Australia	**www.planthealthaustralia.com.au** **biosecurity@phau.com.au**	(02) 6215 7700	Level 1, 1 Phipps Cl Deakin, ACT 2600
New South Wales			
Department of Primary Industries	**www.dpi.nsw.gov.au/biosecurity/plant**	(02) 6391 3535	Locked Bag 21 Orange, NSW 2800
Queensland			
Biosecurity Queensland, a part of the Department of Agriculture and Fisheries, Queensland	**www.daf.qld.gov.au** **callweb@daf.qld.gov.au**	13 25 23[101] 07 3404 6999[102]	41 George Street Brisbane, QLD 4000

[101] Within Qld

[102] Interstate

Agency	Website/email	Phone	Address
Northern Territory			
Department of Primary Industry and Resources	**www.dpir.nt.gov.au/about**	(08) 8999 5511	Berrimah Farm, Makagon Road Berrimah, NT 0828
South Australia			
Primary Industries and Regions SA	**www.pir.sa.gov.au**	(08) 8207 7820	GPO Box 1671 Adelaide, SA 5001
Biosecurity SA-Plant Health	**https://www.pir.sa.gov.au/biosecurity/plant_health PIRSA.planthealth@sa.gov.au**	(08) 8207 7820	33 Flemington Street Glenside, SA 5065
Biosecurity SA-Plant Health Market access and Interstate Certification Assurance	**IRSA.planthealthmarketaccess@sa.gov.au**	(08) 8207 7814	
Biosecurity SA-Plant Health Transport manifest lodgement	**pirsa.planthealthmanifest@sa.gov.au**	Fax: (08) 8124 1467	
South Australian Research and Development Institute	**www.sardi.sa.gov.au** **sardi@sa.gov.au**	(08) 8303 9400	2b Hartley Grove Urrbrae, SA 5064
Tasmania			
Department of Primary Industries, Parks, Water and Environment	**www.dpipwe.tas.gov.au** **BPI.Enquiries@dpipwe.tas.gov.au**	1300 368 550	GPO Box 44, Hobart, TAS 7001
Victoria			
Department of Jobs, Precincts and Regions	**https://djpr.vic.gov.au/**	136 186	CPHO Group, Division of Market Access and Regulation, Biosecurity Branch Department of Economic Development, Jobs, Transport and Resources 475 Mickleham Road, Attwood, Victoria 3047
Western Australia			
Department of Primary Industries and Regional Development	**https://dpird.wa.gov.au/**	(08) 9368 3333	WA DPIRD PO Box 1143 West Perth WA 6872

Farm biosecurity

Introduction

Plant pests can have a major impact on production if not managed effectively. This includes pests already present in Australia and a number of serious pests of summerfruit that Australia does not have.

Farm biosecurity measures can be used to minimise the spread of such pests before their presence is known or after they are identified, and therefore can greatly increase the likelihood that they could be eradicated. This section of the document outlines farm biosecurity and hygiene measures to help reduce the impact of pests on the industry.

The biosecurity and hygiene measures outlined here can be considered as options for each farm's risk management. Many of these measures can be adopted in a way that suits a given farm so that each can have an appropriate level of biosecurity.

Farm biosecurity reporting procedures and hygiene strategies to reduce threats covered in this document are:

- selection and preparation of appropriate plant material
- chemical control measures
- control of vectors
- control of alternative hosts
- neglected farms and volunteer plants
- post-harvest handling and produce transport procedures
- use of warning and information signs
- managing the movement of vehicles and farm equipment
- movement of people
- visiting overseas farms/orchards – what to watch out for when you return
- including farm biosecurity in Industry best management practice and quality assurance schemes
- farm biosecurity checklist

Development of an on-farm biosecurity plan tailored to the needs of an individual operation is a good way to integrate best practice biosecurity with day to day operations (**www.farmbiosecurity.com.au/planner/**). Further information on farm biosecurity can be found at

www.farmbiosecurity.com.au or by contacting Summerfruit Australia Limited or the Canned Fruits Industry Council of Australia.

Reporting suspect emergency plant pests

Rapid reporting of exotic plant pests is critical: early detection gives Australia the best chance to effectively control and eradicate pests. If you find something you believe could be an exotic plant pest, call the Exotic Plant Pest Hotline immediately to report it to your local state or territory government.

The one phone number – 1800 084 881 – will connect to an automated system that allows the caller to choose the state or territory that the report relates to. The caller will then be connected to the relevant authority for that jurisdiction. Most lines are only monitored during business hours. Messages can be left outside of those hours and calls will be returned as soon as an officer is available. A summary of the opening hours for each state and territory is provided in Table 14. Each jurisdiction also has an alternative contact to ensure no report is missed. It does not matter which of these methods is used to report a suspect exotic plant pest. The important thing is to report it.

Calls to the Exotic Plant Pest Hotline will be answered by an experienced person, who will ask some questions to help understand the situation, such as:

- What was seen (describe the pest or send a photo)
- Where it was found
- What it was found on
- How many pests are present/how infected is the crop
- How widely distributed it is
- When it was first noticed

It is important not to touch or move the suspect material as this may spread the exotic pest or render samples unsuitable for diagnostic purposes. A biosecurity officer may attend the location to inspect and collect a sample. In some cases, the biosecurity officer will explain how to send a sample for testing. In this circumstance they will explain how to do this without risk of spreading the pest and allowing it to arrive at the laboratory in a suitable condition to be identified.

Every report will be taken seriously, will be followed up and treated with confidentiality.

Table 14. *Exotic Plant Pest Hotline hours of operation and alternate contact information for reporting per jurisdiction.*

State/ territory	Hotline hours	Alternative contact
NSW	Operates 0830 – 1630 Monday to Friday. After hours answering machine service with messages followed up the next business day.	**biosecurity@dpi.nsw.gov.au**
NT	Operates 0800 – 1630 Monday to Friday. After hours answering machine service with messages followed up the next business day.	**quarantine.NT@nt.gov.au**
QLD	Operates 0800-1700 Monday to Friday (0900-1700 Thursday). Calls outside these hours answered by a third party who will take the message and depending on the urgency of the report, organise a response from a biosecurity officer as soon as possible.	Biosecurity Queensland on 13 25 23
SA	Operates 24 hrs/ 7 days	**Online plant pest report form**[103]
TAS	Operates 24 hrs/ 7 days	Biosecurity Tasmania 03 6165 3777
VIC	Operates 0800 – 1800 Monday to Friday. After hours answering machine service with messages followed up the next business day. Option also to forward to the 24 hr Emergency Animal Disease Watch Hotline.	**plant.protection@ecodev.vic.gov.au**
WA	Operates 0830 – 1630 Monday to Friday. After hours answering machine service with messages followed up the next business day.	**info@agric.wa.gov.au**

Recent changes to legislation in some states includes timeframes for reporting and have implications for those who do not report. It is important that individuals know the obligations for their jurisdiction.

Some summerfruit pests are notifiable under each state or territory's quarantine legislation. Each state or territory's list of notifiable pests are subject to change over time so contacting your local state/territory agricultural agency (Table 11) will ensure information is up to date. Landowners and consultants have a legal obligation to notify the relevant state/territory agriculture agency of the presence of those pests within a defined timeframe (Table 15).

[103] Available from **https://form.jotform.co/70732909804864**

Preparedness

Pest-specific preparedness and response information documents

To help prepare for an incursion response a list of pest-specific preparedness and response information documents are provided in Table 5 that may support a response. Over time, as more resources are produced for pests of the summerfruit industry they will be included in this document and made available through the PHA website. Resources include the development of pest-specific information and emergency response documents, such as fact sheets, contingency plans, diagnostic protocols and a summary of surveillance programs currently in operating for these high priority pests (see **www.planthealthaustralia.com.au/pidd**). These documents and programs should be developed over time for all medium to high risk pests listed in the TSTs (Appendix 2: Threat Summary Tables).

Fact sheets

Fact sheets or information sheets are a key activity of biosecurity extension and education with growers. Fact sheets provide summary information about the pest, its biology, what it looks like and what symptoms it may cause. They also contain detailed images. Refer to Table 15 for a list of current fact sheets available for summerfruit producers.

Contingency Plans

Contingency Plans provide background information on the pest biology and available control measures to assist with preparedness for incursions of a specific pest into Australia (Table 15). The contingency plan provides guidelines for steps to be undertaken and considered when developing a response plan for the eradication of that pest. Any response plan developed using information in whole or in part from a contingency plan must follow procedures as set out in PLANTPLAN and be endorsed by the National Management Group prior to implementation.

As a part of contingency planning, biological and chemical control options are considered as are options for breeding for pest resistance. Through the planning process, it may be discovered that there are gaps in knowledge. Such gaps should be identified and consequently be considered as RD&E needs to be met within the implementation table.

For a list of current contingency plans see **www.planthealthaustralia.com.au/pidd**.

National Diagnostic Protocols

Diagnostic protocols are documents that contain information about a specific plant pest, or related group of pests, relevant to its diagnosis. National Diagnostic Protocols (NDPs) are diagnostic protocols for the unambiguous taxonomic identification of a pest in a manner consistent with ISPM No. 27 – Diagnostic Protocols for Regulated Pests. NDPs include diagnostic procedures and data on the pest, its hosts, taxonomic information, detection and identification.

Australia has a coherent and effective system for the development of NDPs for plant pests managed by the Subcommittee on Plant Health Diagnostics (SPHD). NDPs are peer reviewed and verified before being endorsed by Plant Health Committee (PHC).
Endorsed NDPs are available on the National Plant Biosecurity Diagnostic Network (NPBDN) website (**www.plantbiosecuritydiagnostics.net.au**), together with additional information regarding their development and endorsement.

Diagnostic information for some summerfruit pests (Table 15) is available through the PHA website **www.planthealthaustralia.com.au/pidd**. For diagnostic information on fruit flies, refer to the Australian Handbook for the Identification of Fruit Flies, available from the PHA website.

***Table 15**. Pest-specific information and documents for the summerfruit industry, complied from the summerfruit industry TST. *Indicates a HPP for the summerfruit industry.*[104]

Scientific name	Common name	Fact sheet	Contingency plan	Diagnostic protocols
INVERTEBRATES				
ACARI (Mites)				
Tetranychus pacificus	Pacific spider mite	Yes[105]	Not developed	Draft
Tetranychus turkestani (syn. *T.atlanticus*)	Strawberry spider mite	Yes[105]	Not developed	Draft
Oligonychus perseae	Persea mite	Yes[106]	Not developed	Not developed
DIPTERA (Flies and midges)				
Anastrepha fraterculus	South American fruit fly	Yes[107]	Not developed	Not developed
**Anastrepha ludens*	Mexican fruit fly	Yes[107,108]	Not developed	Not developed
**Anastrepha serpentina*	Sapodilla fruit fly, Sapote fruit fly	Yes[107]	Not developed	Not developed
**Anastrepha striata*	Guava fruit fly	Yes[107]	Not developed	Not developed
Anastrepha suspensa	Caribbean fruit fly	Yes[108]	Not developed	Not developed
Bactrocera correcta	Guava fruit fly	Yes[107]	Not developed	Not developed

[104] Copies of these documents are available from www.planthealthaustralia.com.au/pidd or by contacting the relevant state/territory agriculture agency.
[105] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Spider-mites-FS.pdf
[106] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Persea-mite-FS.pdf
[107] http://www.planthealthaustralia.com.au/wp-content/uploads/2018/10/The-Australian-Handbook-for-the-Identification-of-Fruit-Flies-v3.1.pdf
[108] http://www.planthealthaustralia.com.au/wp-content/uploads/2015/01/Exotic-fruit-flies-FS.pdf

Scientific name	Common name	Fact sheet	Contingency plan	Diagnostic protocols
Bactrocera curvipennis	Banana fruit fly	Yes[107]	Not developed	Not developed
**Bactrocera dorsalis* (syn. *B. invadens*, *B. papayae*, *B. philippinensis*)	Oriental fruit fly, Philippine fruit fly, Invasive fruit fly, Asian Papaya fruit fly	Yes[107,109]	Yes	Not developed
Bactrocera facialis	Tongan fruit fly, tropical fruit fly	Yes[107]	Not developed	Not developed
Bactrocera psidii	South sea guava fruit fly	Yes[107]	Not developed	Not developed
Bactrocera trivialis	New Guinea fruit fly	Yes[107]	Not developed	Not developed
Bactrocera zonata	Peach fruit fly	Yes[107]	Not developed	Not developed
Ceratitis rosa	Natal fruit fly	Yes[107]	Not developed	Not developed
**Drosophila suzukii*	Spotted wing drosophila	Yes[107,110]	Not developed	Not developed
Rhagoletis completa	Walnut husk fly	Yes[107,111]	Not developed	Not developed
Rhagoletis pomonella	Apple maggot fly	Yes[107,112]	Not developed	Not developed
Zeugodacus cucurbitae (syn. *Bactrocera cucurbitae*)	Melon fruit fly	Yes[107,113]	Not developed	Not developed
COLEOPTERA (Beetles and weevils)				
Conotrachelus nenuphar	Plum curculio, American plum weevil, peach curculio	Yes[114,115]	Not developed	Not developed
Popillia japonica	Japanese beetle	Yes[116]	Not developed	Not developed
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)				
Amblypelta cocophaga	Coconut bug	Yes[117]	Not developed	Not developed
Chinavia hilaris (syn. *C. hilare, C. halaris, Nezara hilaris, Acrosternum hilaris, Acrosternum hilare, Pentatoma hilaris*)	Green stink bug, green solider bug	Yes[118]	Not developed	Not developed
Dysaphis plantaginea	Rosy apple aphid	Yes[119]	Not developed	Draft
**Halyomorpha halys*	Brown marmorated stink bug, Yellow-brown stink bug	Yes[120]	Yes[121]	Not developed
**Homalodisca vitripennis*	Glassy-winged sharpshooter	Yes[122]	Yes[123,124]	Yes[125]
Lygus hesperus	Western tarnished plant bug	Yes[126]	Not developed	Not developed

[109] **http://www.planthealthaustralia.com.au/pests/oriental-fruit-fly/**
[110] **http://www.planthealthaustralia.com.au/pests/spotted-winged-drosophila/**
[111] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Walnut-husk-fly-FS.pdf**
[112] **http://www.planthealthaustralia.com.au/pests/apple-maggot/**
[113] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/09/Melon-fruit-fly-FS.pdf**
[114] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Plum-curculio-FS-Summerfruit.pdf**
[115] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Plum-curculio-FS-Cherry.pdf**
[116] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/09/Japanese-beetle-FS.pdf**
[117] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Coconut-bug-FS.pdf**
[118] **http://www.planthealthaustralia.com.au/wp-content/uploads/2016/04/Green-stink-bug-FS.pdf**
[119] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Rosy-apple-aphid-FS.pdf**
[120] **http://www.planthealthaustralia.com.au/wp-content/uploads/2016/04/Brown-Marmorated-Stink-Bug-FS.pdf**
[121] **https://portal.biosecurityportal.org.au/bmsb/Documents/BMSB%20Contingency%20Plan%20FINAL.pdf**
[122] **http://www.planthealthaustralia.com.au/pests/glassy-winged-sharpshooter/**
[123] **http://www.planthealthaustralia.com.au/wp-content/uploads/2017/11/Xylella-fastidiosa-CP-NG-2017.pdf**
[124] **http://www.planthealthaustralia.com.au/wp-content/uploads/2017/11/Glassy-winged-sharp-shooter-CP-NG-2017.pdf**
[125] **http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-23-Glassy-winged-sharpshooter-Homalodisca-vitripennis-V1.2.pdf**
[126] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Tarnished-and-Western-plant-bugs-FS.pdf**

Scientific name	Common name	Fact sheet	Contingency plan	Diagnostic protocols
Lygus lineolaris	Tarnished plant bug	Yes[127]	Yes[128]	Not developed
Pseudococcus maritimus	Grape mealybug, baker's mealybug, pear mealybug, vine mealybug	Yes[129]	Not developed	Not developed
LEPIDOPTERA (Butterflies and moths)				
Adoxophyes orana	Summer fruit tortrix, apple peel tortrix, smaller tea tortrix	Not developed	Not developed	Yes[130]
Anarsia lineatella	Peach twig moth, Peach twig Borer	Yes[131]	Not developed	Not developed
Argyrotaenia citrana (syn. *Argyrotaenia franciscana, Tortrix citrina*)	Orange tortrix, apple skinworm	Yes[132]	Not developed	Not developed
Ctenopseustis obliquana (syn. Ctenopseustis herana)	Brown headed leafroller	Yes[133]	Not developed	Not developed
Cydia latiferreana	Filbertworm	Yes[134]	Not developed	Not developed
Lobesia botrana	Grape berry moth	Yes[135]	Not developed	Not developed
**Lymantria dispar*	Asian gypsy moth	Yes[136]	Yes[137]	Draft
Lymantria monacha	Nun moth	Yes[138]	Not developed	Not developed
Orgyia thyellina	White-spotted tussock moth	Yes[139]	Not developed	Not developed
Planotortrix excessana	Orchard leafroller, Greenheaded leafroller	Yes[140]	Not developed	Not developed
Planotortrix octo	Greenheaded leafroller	Yes[141]	Not developed	Not developed
Platynota stultana	Omnivorous leafroller	Yes[142]	Not developed	Not developed
Thaumatotibia leucotreta (syn. *Cryptophlebia leucotreta*)	False codling moth, citrus codling moth, orange codling moth, orange moth	Yes[143]	Yes[144]	Not developed
PATHOGENS				
BACTERIA (including phytoplasmas)				
Candidatus Phytoplasma pruni	Peach X disease	Yes[145]	Not developed	Yes[146]

[127] **http://www.planthealthaustralia.com.au/pests/tarnished-plant-bug/**
[128] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Tarnished-plant-bug-CP-2011.pdf**
[129] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Vine-and-Grape-mealybug-FS.pdf**
[130] **http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2016/11/NDP-30-Summer-Fruit-Tortrix.pdf**
[131] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Peach-twig-borer-FS.pdf**
[132] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Orange-tortrix-FS.pdf**
[133] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Exotic-leaf-roller-FS.pdf**
[134] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Filbertworm-FS.pdf**
[135] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/11/Grape-berry-moths-FS.pdf**
[136] **http://www.planthealthaustralia.com.au/pests/gypsy-moth/**
[137] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Gypsy-moth-CP-2009.pdf**
[138] **http://www.planthealthaustralia.com.au/wp-content/uploads/2015/07/Nun-moth-FS.pdf**
[139] **http://www.planthealthaustralia.com.au/wp-content/uploads/2015/07/White-spotted-tussock-moth-FS.pdf**
[140] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Exotic-leaf-roller-FS.pdf**
[141] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Exotic-leaf-roller-FS.pdf**
[142] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Omnivorous-leaf-roller-FS.pdf**
[143] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/False-codling-moth-FS.pdf**
[144] **http://www.planthealthaustralia.com.au/wp-content/uploads/2016/03/Chewing-insect-pests-of-grain-CP.pdf**
[145] **http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Peach-X-disease-FS.pdf**
[146] **http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-17-X-disease-phytoplasma-V1.2.pdf**

Scientific name	Common name	Fact sheet	Contingency plan	Diagnostic protocols
Candidatus Phytoplasma prunorum	European stone fruit yellows	Yes[147]	Not developed	Yes[148]
Candidatus Phytoplasma mali	Apple proliferation	Yes[149]	Not developed	Not developed
FUNGI				
Monilinia fructigena	Brown rot	Yes[150,151]	Not developed	Yes[152]
Neonectria ditissima (syn. *Neonectria galligena*)	European canker, nectria canker, crotch canker, eye rot	Yes[153]	Not developed	Yes[154]
Pseudomonas amygdali	Bacterial canker of almond	Yes[155]	Not developed	Not developed
VIRUSES AND VIRORIDS				
**Plum pox virus*	Sharka	Yes[156]	Yes[157]	Yes[158]
Raspberry ringspot virus (Nepovirus)	Raspberry ringspot virus, raspberry Scottish leaf curl virus, red currant ringsport virus, European rasp leaf of cherry, ringspot of strawberry, ring spot of raspberry	Yes[159]	Not developed	Not developed
Strawberry latent ringspot (Sadwavirus), Aesculus line pattern virus, rhubarb virus 5, SLRSV (with vector)	Latent ring spot virus of strawberry	Yes[160]	Not developed	Not developed
Tomato black ring virus	Ring spot of beet, black ring of tomato	Yes[161]	Not developed	Not developed
Tomato ringspot virus (Nepovirus) (syn. *Peach yellow bud mosaic virus, Blackberry mosaic virus, Red currant mosaic virus*)	Tomato ringspot virus, Prunus stem pitting disease	Yes[162]	Not developed	Not developed
**Xylella fastidiosa*	Phony disease of peach, plum leaf scald, Pierce's disease of grapevines	Yes[163]	Yes[164]	Yes[165]

[147] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/European-stone-fruit-yellows-FS.pdf
[148] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-12-European-stone-fruit-yellows-V1.2.pdf
[149] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Apple-proliferation-FS.pdf
[150] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Brown-rot-FS-Summerfruit.pdf
[151] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Apple-brown-rot-FS.pdf
[152] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-1-Apple-Brown-Rot-Monilinia-fructigena-2.1.pdf
[153] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/European-canker-FS.pdf
[154] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-21-European-canker-Neonectria-ditissima-V1.2.pdf
[155] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Hyperplastic-canker-FS.pdf
[156] http://www.planthealthaustralia.com.au/pests/plum-pox-virus/
[157] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Aphid-transmitted-viruses-CP-2011.pdf
[158] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-2-Plum-Pox-Virus-V3.1.pdf
[159] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Nepovirus-group-FS.pdf
[160] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Nepovirus-group-FS.pdf
[161] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Nepovirus-group-FS.pdf
[162] http://www.planthealthaustralia.com.au/wp-content/uploads/2013/03/Nepovirus-group-FS.pdf
[163] http://www.planthealthaustralia.com.au/pests/pierces-disease/
[164] http://www.planthealthaustralia.com.au/wp-content/uploads/2017/11/Xylella-fastidiosa-CP-NG-2017.pdf
[165] http://plantbiosecuritydiagnostics.net.au/wordpress/wp-content/uploads/2015/03/NDP-6-Pierces-disease-Xylella-fastidiosa-V1.2.pdf

Research Development and Extension

Research, Development and Extension – Linking Biosecurity Outcomes to Priorities

Through the biosecurity planning process, gaps in knowledge or extension of knowledge will have been identified and need to be documented in the implementation table. Some of these gaps will require further research and development (e.g. understanding risk pathways, developing surveillance programs or diagnostic protocols, developing tools to facilitate preparedness and response, developing IPM or resistance breeding strategies), other gaps will require communication or extension of that knowledge to various target audiences (developing awareness raising materials, undertaking training exercises, running workshops, consideration of broader target audiences).

It is important that the RD&E gaps identified through this plan feed directly into the normal annual RD&E priority setting and strategic planning activities that an industry undertakes. This is fundamental if an industry is to progress biosecurity preparedness and response throughout the life of the biosecurity plan.

Market access

As an active trading nation, Australia has entered into a number of multilateral and bilateral trade agreements that influence its plant biosecurity system. On a multilateral level, Australia's rights and obligations in relation to plant biosecurity are set out under World Trade Organization (WTO) agreements, particularly the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), although others may apply in certain circumstances.

The SPS Agreement provides WTO member countries with the right to use sanitary and phytosanitary measures to protect human, animal and plant life or health. Under this agreement countries are allowed to specify consistent, science-based conditions aimed at providing sanitary and phytosanitary protection but not unnecessarily restricting trade. The establishment of exotic pests in Australia may result in conditions on Australian exports that previously did not apply and in some cases, may result in the short or long term loss of overseas markets, depending on the significance of the pest to the trading partner and the availability of options to reduce the risk to acceptable levels. These options could include measures such as pest free areas or place of production or treatments e.g. cold or fumigation. The time taken to regain access will depend on the availability and acceptance of measures to reduce risk and the receiving markets risk appetite.

Market access for the summerfruit industry

Export is a high priority for the summerfruit industry (see page 108 for more information). The Australian summerfruit industry have identified China, Hong Kong, Indonesia, Malaysia, Saudi Arabia, Singapore and the United Arab Emirates as important export markets. The development of these markets may be hampered by the establishment of exotic pests. To this end, the likelihood of entry restrictions being imposed by these three markets if a high priority pest (Table 1) is detected in Australia, has been summarised below (Table 16). Market access information has not been included for the canned fruit industry as there is little export of canned fruit and processing mitigates the risk of accidental pest introduction.

Table 16. *Likelihood of entry restrictions being imposed for existing markets if an exotic high priority pest established in Australia. A pest is unlikely to cause market access issues if it is already present in a country, but it is possible if the pest is not known to occur in that country or has restricted distributions*

High Priority Pest	China (nectarine and peach)	Hong Kong (apricot, nectarine, peach and plum)	Indonesia (plum)	Malaysia (plum)	Saudi Arabia (apricot, nectarine and peach)	Singapore (apricot, nectarine, peach and plum)	United Arab Emirates (apricot, nectarine and peach)
DIPTERA (Flies and midges)							
Mexican fruit fly (*Anastrepha ludens*)	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
Sapodilla fruit fly, Sapote fruit fly (*Anastrepha serpentina*)	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
Guava fruit fly (*Anastrepha striata*)	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
Oriental fruit fly (*Bactrocera dorsalis*)	Present	Present	Present	Present	Not known to be present	Present	Present
Spotted wing drosophila (*Drosophila suzukii*)	Present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)							
Brown marmorated stink bug (*Halyomorpha halys*)	Present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
LEPIDOPTERA (Butterflies and moths)							
Asian gypsy moth (*Lymantria dispar*)	Present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present

High Priority Pest	China (nectarine and peach)	Hong Kong (apricot, nectarine, peach and plum)	Indonesia (plum)	Malaysia (plum)	Saudi Arabia (apricot, nectarine and peach)	Singapore (apricot, nectarine, peach and plum)	United Arab Emirates (apricot, nectarine and peach)
BACTERIA (including phytoplasmas)							
Phony disease of peach, plum leaf scald, **citrus variegated chlorosis** (*Xylella fastidiosa*)	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present
VIRUSES AND VIRORIDS							
Sharka (*Plum Pox virus*)	Present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present	Not known to be present

Implementation actions

To help maintain or facilitate market access, in the event of an incursion, the summerfruit industry in partnership with the Department of Agriculture and the relevant state and territory governments should develop the following, for the pests identified in Table 16:

- Surveillance plan including a method for collecting and storing surveillance data
- Diagnostic protocols that have been assessed in the Australian environment
- Biosecurity treatment measures (e.g. irradiation or fumigation)

Implementation of these actions will be required for all pests as this data will also be crucial for maintaining interstate trade should an incursion occur within Australia, resulting in a restricted distribution or quarantine zone. The implemented system should also take into account the likelihood of having entry restrictions imposed by overseas trade partners for those pests identified as possible in Table 16. A single system will facilitate market access discussions for both domestic and international trade and will minimise the potential disruption to the industry.

References

Department of Agriculture, Fisheries and Forestry (2011) Import Risk Analysis Handbook 2011. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

National Plant Health Status Report (2017) Plant Health Australia, Canberra ACT. **http://www.planthealthaustralia.com.au/national-programs/national-plant-biosecurity-status-report/**

RESPONSE MANAGEMENT

Introduction

No matter how many preparedness activities are undertaken or how much surveillance is done at the border, a small amount of plant pests will inevitably make their way into Australia. This section outlines the national agreements and processes in place to effectively respond to such incursions.

Gathering information, developing procedures, and defining roles and responsibilities during an emergency can be extremely difficult. To address this area, PHA coordinated the development of PLANTPLAN, a national set of incursion response guidelines for the plant sector, detailing the procedures required and the roles and responsibilities of all Emergency Plant Pest Response Deed (EPPRD) signatories affected by an Emergency Plant Pest (EPP).

The following section includes key contact details and communication procedures that should be used in the event of an incursion in the summerfruit industry. Additionally, a listing of pest-specific emergency response and information documents are provided that may support a response. Over time, as more of these documents are produced for pests of the summerfruit industry they will be included in this document and made available through the PHA website.

The Emergency Plant Pest Response Deed

A fundamental component of the Australian plant biosecurity system is the EPPRD, which is an agreement between the Australian government, the state/territory governments, 39 plant industries (including Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia) and PHA (collectively known as the signatories), that allows the rapid and efficient response to Emergency Plant Pests (EPPs). The EPPRD is a legally binding document that outlines the basic operating principles and guidelines for eradication responses of EPPs.

The EPPRD provides:

- A national response management structure that enables all governments and plant industry signatories affected by the EPP to contribute to the decisions made about the response.

- An agreed structure for the sharing of costs to deliver eradication responses to EPPs detected in Australia. Costs are divided between signatories affected by the EPP in an equitable manner based on the relative potential impact of the EPP.
- A mechanism to encourage reporting of EPP detections and the implementation of risk mitigation activities.
- a mechanism to reimburse growers whose crops or property are directly damaged or destroyed as a result of implementing a Response Plan
- early detection and response
- rapid responses to EPPs (excluding weeds)
- decisions to eradicate are based on appropriate criteria (e.g. eradication must be technically feasible and cost beneficial)
- an industry commitment to biosecurity and risk mitigation and a government commitment to best management practice
- Cost Sharing of eligible costs
- an Agreed Limit for Cost Sharing (calculated as 2 % of the local value of production for one year of the Affected Industry Party or as defined in Schedule 14 of the EPPRD). The Agreed Limit can be exceeded with the agreement of Affected Parties.
- an effective industry/government decision-making process.

For further information on the EPPRD, including copies of the EPPRD, Fact Sheets or Frequently Asked Questions, visit **www.planthealthaustralia.com.au/epprd** and **www.planthealthaustralia.com.au/epprd-qa**.

PLANTPLAN

PLANTPLAN outlines the generic approach to response management under the EPPRD and introduces the key roles and positions held by industry and government during a response. The document is supported by a number of operating guidelines, job cards and standard operating procedures that provide further detail on specific topics. PLANTPLAN underpins the EPPRD and is endorsed by all EPPRD signatories.

The current version of PLANTPLAN and supporting documents are available on the PHA website (**http://www.planthealthaustralia.com.au/biosecurity/incursion-management/plantplan/**).

For more information about PLANTPLAN and the supporting document visit **www.planthealthaustralia.com.au/biosecurity/incursion-management/plantplan/**

Funding a response under the EPPRD

The following section outlines how eradication responses are nationally cost shared between affected industries and governments.

A copy of the EPPRD can be downloaded from the PHA website **www.planthealthaustralia.com.au/epprd**.

Cost sharing a response

Affected industries and governments invest in the eradication of EPPs and share the costs of an agreed response plan, this is referred to as 'cost sharing'. Not all activities in a response are eligible to be cost shared, with some activities considered as normal commitments[166] for signatories.

The cost shared costs of a response are divided between affected industries and governments in an equitable manner directly related to the benefit of eradicating the EPP. These relative benefits are represented by the category of the pest, with the overall view that 'the higher the benefit, the greater the investment'.

There are four categories for EPPs (Table 17). The category indicates how the funding will be split between government and industries; with the governments funding the share of public benefit and industry funding the share of private benefit. It does not indicate its likelihood of eradication or its overall importance i.e. an EPP listed as Category 1 is not deemed to be any more or less important than an EPP listed as Category 4.

Table 17. *Response funding allocation between Government and Industry for an EPP.*

Category of EPP	Government Funding	Industry Funding
Category 1	100%	0%
Category 2	80%	20%
Category 3	50%	50%
Category 4	20%	80%

[166] Further information can be found in the guideline document for Normal Commitments for Parties to the Emergency Plant Pest Response Deed available to download from **http://www.planthealthaustralia.com.au/biosecurity/incursion-management/plantplan/**.

Pest categorisation

The list of categorised EPPs can be found in *schedule 13 of the EPPRD*. In the event that a response plan is endorsed for an uncategorised EPP, cost sharing will commence using the default category (Category 3) and may be revised later.

Any signatory to the EPPRD can request for additional pests to be categorised and added to *schedule 13 of the EPPRD*. Contact **EPPRD@phau.com.au** for more information and guidance on this process.

Once a substantiated request has been received by PHA a group of independent scientific technical experts (known as the categorisation group) will be convened to assess all known information about the EPP to identify the public and private benefits. Full details can be found in clauses 7 and 9 of the EPPRD.

Summerfruit EPPs categorised to date

EPPs for the summerfruit industry that are categorised and listed within *schedule 13* of the EPPRD[167] are listed in Table 18.

Table 18. *Formal categories for pests of the summerfruit industry listed on schedule 13 of the EPPRD (as at January 2019).*[168]

Formal category	Scientific name	Common name
2	*Adoxophyes orana*	Summer fruit tortrix
2	*Bactrocera dorsalis* (syn. *B. invadens*, *B. papayae*, *B. philippinensis*)	Oriental fruit fly, Philippine fruit fly, Invasive fruit fly, Asian Papaya fruit fly
2	*Conotrachelus nenuphar*	Plum weevil
2	*Cryptophlebia leucotreta* (syn. *Thaumatotibia leucotreta*)	False codling moth
2	*Erwinia amylovora*	Fire blight
2	*Phymatotrichopsis omnivore* (syn. *Phymatotrichum omnivorum*)	Texas root rot
2	*Potyvirus Plum pox virus*	Plum pox virus/sharka
2	*Xylella fastidiosa*	Pierces disease
3	*Apiosporina morbosa*	Black knot
3	MLO (syn. *Candidatus* Phytoplasma prunorum)	European stone fruit yellows

[167] For the latest version of Schedule 13, refer to the EPPRD version found at **planthealthaustralia.com.au/epprd**

[168] Note scientific and common names are listed as they appear in the EPPRD

Formal category	Scientific name	Common name
3	MLO (syn. *Candidatus* Phytoplasma pruni)	Peach X disease
3	*Monilinia fructigena*	Brown rot
3	*Neonectria ditissima*	European canker
4	*Lygus hesperus*	Western plant bug

How to respond to a suspect EPP

Following the detection of a suspect EPP, the relevant state agency will be notified either directly or through the Exotic Plant Pest Hotline. Within 24 hours of the state agency having a reasonable suspicion that they are dealing with an EPP the, Chief Plant Health Manager (CPHM) of the state or territory, will inform the Australian Chief Plant Protection Officer (ACPPO). All signatories affected by the EPP (both government and industry) are then notified immediately, and a Consultative Committee on Emergency Plant Pests (CCEPP) meeting is convened (this process is outlined in Figure 4). Only the industry signatories affected by the EPP are engaged in the response process. These are determined based on the known hosts of the EPP. All positive detections of EPPs or suspect EPPs must undergo secondary identification from an independent laboratory. Confirmation of the identification should not delay the reporting of the EPP to the ACPPO or the CCEPP.

Figure 4. *Reporting suspect EPPs and notification process.*

Once a pest is notified to the CCEPP, all signatories that are affected by the EPP play a part in the national management of EPP response. This is primarily through the two national decision-making committees, both of which Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia have a representative on:

- The Consultative Committee on Emergency Plant Pests (CCEPP) which provide technical expertise on the response
- The National Management Group (NMG) which acts on recommendations from the CCEPP and make the final decisions about EPP responses and funding.

Technical and economic considerations are reviewed, and a decision made on whether to eradicate using the cost sharing mechanisms under the EPP (i.e. develop a response plan) or take another course of action (potentially to contain or do nothing which will mean long term management of the pest).

The relevant state/territory agriculture department is responsible for the on-ground response to EPPs and will adopt precautionary emergency containment measures if appropriate. Depending on the nature of the EPP, measures could include:

- restriction of operations in the area
- disinfection and withdrawal of people, vehicles and machinery from the area

- restricted access to the area
- control or containment measures.

Each response to an EPP is applied differently due to the nature of the incursion, however each follow the defined phases of a response as due to the nature of the incursion, however each follows the defined phases of a response as summarised in Figure 5 and in the text below.

Further information about the response processes under the EPPRD can be found in the PHA Foundation Course and National EPP Response Management BOLT courses[169].

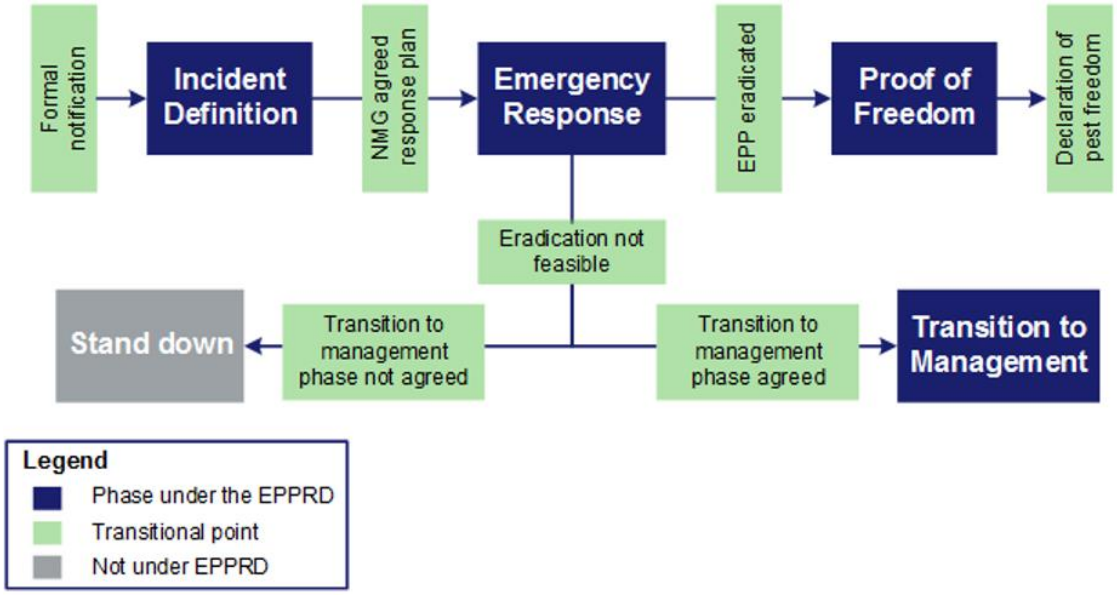

Figure 5. *EPPRD response phases.*

Owner reimbursement costs

Owner Reimbursement Costs (ORCs) are included in the shared costs of a response and are available to eligible growers to alleviate the financial impacts of crops or property that are directed to be destroyed under an agreed response plan.

ORCs were developed to encourage early reporting and increase the chance of successful eradication. ORCs are paid to the owner and cover direct costs associated with implementing a response plan, including:

[169] All of PHA's BOLT courses are feely available at **https://pha.canopihr.com.au**

- Value of crops destroyed,
- Replacement of lost capital items and
- Fallow periods

ORCs are only available when there is an approved response plan under the EPPRD, and only to industries that are signatories to the EPPRD, such as the summerfruit industry.

The value of ORCs is directed by the **ORC Evidence Frameworks** and is based on an agreed valuation approach developed for each industry.

Further information about ORCs is available from **www.planthealthaustralia.com.au/biosecurity/incursion-management/owner-reimbursement-costs/**

Industry specific response procedures

Industry communication

Summerfruit Australia Limited are the peak industry body for the summerfruit industry and the Canned Fruits Industry Council of Australia are the peak industry body for the canned fruits industry[170], i.e. signatories to the EPPRD, and will be the key industry contact points if a plant pest affecting the summerfruit industry is detected and responded to using the arrangements in the EPPRD. Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia will have responsibility for relevant industry communication and media relations (see PLANTPLAN for information on approved communications during an incursion). The contacts nominated for the CCEPP and the NMG by Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia will be contacted (Table 19) regarding any meetings of the CCEPP or NMG. It is important that all Parties to the EPPRD ensure their contacts for these committees are nominated to PHA and updated swiftly when personnel change.

Close cooperation is required between relevant government and industry bodies to ensure the effective development and implementation of a response to an emergency plant pest, and the management of media/communication and trade issues. Readers should refer to PLANTPLAN or undertake the relevant BOLT courses for further information.

[170] For further information on Summerfruit Australia Limited refer schedule 7 available at **http://www.planthealthaustralia.com.au/biosecurity/emergency-plant-pest-response-deed/**

Table 19. *Contact details for Summerfruit Australia Limited and the Canned Fruits Industry Council of Australia.*

Summerfruit Australia Limited	
Website	**https://summerfruit.com.au/**
Postal address	P.O. Box 1726, Wodonga, Victoria, 3689
Email	**ceo@summerfruit.com.au**
Phone	(02) 6059 0816
Fax	(02) 6021 0011
Canned Fruits Industry Council of Australia	
Website	http://fgv.com.au/
Postal address	PO Box 612, Mooroopna, Victoria 3629
Email	**chris.pollard@spc.com.au**
Phone	(03) 5833 3786

References

PLANTPLAN (2017) PLANTPLAN Australian Emergency Plant Pest Response Plan. Version 1. (**www.planthealthaustralia.com.au/plantplan**).

APPENDIX 1: PROFILE OF THE AUSTRALIAN SUMMERFRUIT INDUSTRY

Summerfruit industry background

To develop any biosecurity plan it is critical to understand the profile and context of the industry.

Summerfruit Australia Limited

Summerfruit Australia Limited (SAL) is the national peak body, representing Australian summerfruit producers (apricots, nectarines, peaches and plums). SAL represents the interests of and provides knowledge exchange, communications and advocacy to its members all along the supply chain (Summerfruit Australia Limited 2019). SAL is a company limited by guarantee with a leadership elected directly by its growers and a national office based in Albury, NSW (Summerfruit Australia Limited 2019).

In 1999 a statutory levy of 1 cent per kilogram of production was introduced to fund research, development and extension for the industry (HAL and SAL 2011). The summerfruit industry is also a signatory to the Emergency Plant Pest Response Deed, coordinated by Plant Health Australia. The associated biosecurity levy is set at 0 to be activated in the event of an emergency response to an emergency plant pest.

Summerfruit Australia works closely with Hort Innovation to manage the industry's Research, Development and Promotions Programs. Summerfruit Australia also works with a range of other organisations including government and commercial businesses with the aim of encouraging the long-term sustainable growth of the Australian summerfruit industry.

Canned Fruits Industry Council of Australia

The Canned Fruit Industry Council of Australia is the peak industry body that represents the biosecurity interests of canned fruits producers and the industry and is comprised by growers and processor representatives in equal parts (CFICA, 2010). CFICA has been operating in the Goulburn-Murray Valleys region of Victoria processing Australian plums, peaches, apricots, apples and pears for more than 90 years (NPBSR, 2018). CFICA is a member of Plant Health Australia and a signatory to the Emergency Plant Pest Response Deed.

Industry profile

Summerfruit belong to the Rosaceae family and the term refers to the peach, plum, nectarine and apricot fruits. Summerfruit are tree fruits, usually grown using rootstocks on trees typically ranging from 4 – 11 m tall (AgriFutures Australia 2017). Like many horticultural industries, the profile is diverse, with growers ranging from small hobby producers through to large commercial producers. In Australia, summerfruit are grown by about 1200 growers across 26 growing regions (Summerfruit Australia Limited 2019), primarily within Victoria which produces 28% of all production, New South Wales (28%) and Tasmania (25%) (Horticulture Innovation Australia Limited 2018).

Summerfruit thrive in warm, dry conditions on light soil types with good drainage. In Australia, summerfruit are often produced under irrigated systems. All of the summerfruit require a cold period over winter to signal the tree to break it's dormancy, known as a chilling requirement. This is measured according to accumulated hours where temperatures are below 7°C (AgriFutures Australia 2017). Different varieties have different chilling requirements. Correspondingly, the major growing regions of nectarines and peaches are Goulburn Valley and Sunraysia in Victoria and Young and Orange in New South Wales. Nectarines and peaches are available from October through to April. Popular nectarine varieties include Arctic Rose, Summer Fire, Fantasia and Arctic Snow, while popular peach varieties include Golden Queen, Flordagold, Rich Lady, White Lady and Zee Lady (Summerfruit Australia Limited 2019).

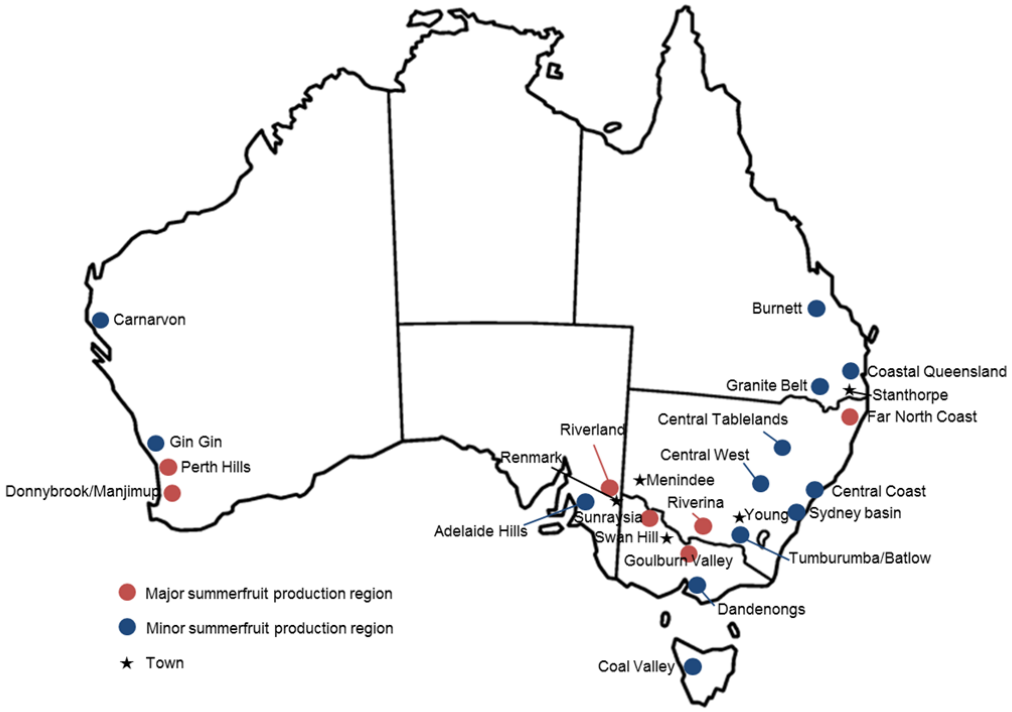

Figure 6: Major and Minor production areas of summerfruit in Australia.

Australian apricots are available from November to February, the bulk of which are grown in the Goulburn Valley and Swan Hill in Victoria, Renmark in South Australia and the Perth Hills in Western Australia. Some Australian apricot varieties include Glengarry, Trevatt, Plumcot and Bulida (Summerfruit Australia Limited 2019). The key production areas for plums also includes the Goulburn Valley, Young and Orange, and Perth in Western Australia. Plums are available between November and April, with varieties including Black Diamond, Black Amber, Amber Jewel, Primetime and Fortune (AgriFutures Australia 2019).

Summerfruit are high in dietary fibre and potassium and are rich in vitamins A, C and E. This is one of the reasons that summerfruit are in high demand in Australian households and on the international market. In 2016-17, 126 177 tonnes of summerfruit was produced in Australia, with a farm-gate value of $386 million (Horticulture Innovation Australia Limited 2018). Of this, 74% was marketed as fresh produce on the domestic market while 15% was forwarded for processing into products such as dried fruit, preserved fruit products, jam, liquors and juice. In the year ending June 2017, 11% (13 975 tonnes) of summerfruit was exported, conveying a value of $51.4 million to the Australian economy (Horticulture Innovation Australia Limited 2018). The principal export markets include Hong Kong, UAE, China, Singapore, Saudi Arabia and Indonesia (Horticulture Innovation Australia Limited, 2018). While the Australian summerfruit export market is relatively small, production occurs out of season compared to

larger exporting nations which contributes to the attainment of a premium price for Australian produce (HAL and SAL 2011).

Table 20: Production of summerfruit commodities for the year 2016-17 (Australian Horticultural Statistics Handbook 2018).

Commodity	Total Production (Tonnes)	Production as a percentage of total summerfruit	Processing volume (Tonnes)	Fresh domestic volume (Tonnes)	Fresh export volume (Tonnes)
Apricots	7, 163	6%	1, 255	5, 476	431
Nectarines and peaches	92, 017	73%	8, 829	74, 165	9, 023
Plums	26, 997	21%	8, 531	13, 945	4, 521
Summerfruit	126, 177	-	18, 615	93, 587	13, 975

Summerfruit are highly perishable and have a short shelf-life of 3-7 weeks (AgriFutures Australia 2019). As a consequence, harvests need to be planned well and fruit picked when it is mature but not yet ripe to avoid bruising. In order to achieve the best quality from the fruit, orchards are harvested multiple times a week and fruit for the fresh market is generally picked by hand (AgriFutures Australia 2017). Summerfruit that is destined for processing is mechanically harvested. Given that mechanical harvesters remove all fruit from the tree at once, gibberellic acid is often applied prior to harvesting to reduce fruit loss from pre-harvest drop, to delay fruit maturity and to increase the fruit size and sweetness (AgriFutures Australia 2017).

The Australian summerfruit industry adheres to strict food safety standards and basic quality parameters which prescribe standards for fruit shape, colour and skin blemishes. Summerfruit Australia Limited and Horticulture Innovation Australia work together to support Australian summerfruit growers in producing the highest quality fruit and achieving the best prices (Summerfruit Australia 2019). Looking toward the future, the objectives of the industry are to; increase demand and improve market performance, reduce costs in the production and supply chain and improve quality and consistency of produce (Summerfruit Australia 2019).

The canned fruit industry represents more than 110 fruit growing businesses and one processor. In the year 2017-2018, production of canned fruit was valued at $19.3 million (LVP), which was an increase of $1.6 million over the previous year's production (NPBSR, 2018). Production of fruit varieties that are represented by CFICA (apricots, peaches, pears

and plums) for canning, are primarily grown in the Goulburn Valley region of Victoria (Hort Innovation, 2018).

For the year ending, June 2018, 61,299 tonnes of fresh fruit was produced for canning, of which 38 per cent was summerfruit (Hort Innovation, 2018). Peaches are the largest canned summerfruit crop representing 33 percent of total canned fruit production, while other summerfruit consist of 5 per cent of production (Hort Innovation, 2018). Other crops produced for canning include pineapples (33 per cent) and pears (21 per cent) (Hort Innovation, 2018).

References

AgriFutures Australia (2017). Plums – overview, **https://www.agrifutures.com.au/farm-diversity/plums-prunes/** (accessed 07.02.2019).

Canned Fruits Industry Council of Australia, 201.0 Draft report on Rural Research and Development Corporations. Available from https://www.pc.gov.au/inquiries/completed/rural-research/submissions/subdr250.pdf

Fruit Growers Victoria, 2014. Fruit Growers Victoria Annual Report. Available from **FGVL ANNUAL REPORT 141014 2014 Annual Report. FINAL PDF COPY small.pdf**

Horticulture Australia Limited (HAL), Summerfruits Australia Limited (SAL) (2011). Industry Annual Report 2011. **https://summerfruit.com.au/wp-content/uploads/2016/09/Annual-Industry-Report-2011-Summerfruit-Australia.pdf**

Horticulture Innovation Australia Limited (2018). Horticulture Statistics Handbook 2016/17. Horticulture Australia Limited, **file:///C:/Users/ELamberton/Downloads/AH15001-horticulture-statistics-handbook-2016-17-fruit.pdf**

Summerfruit Australia Limited (2019). Australian summerfruit, **https://summerfruit.com.au/about/australian-summerfruit/** (accessed 07.02.2019).

APPENDIX 2: THREAT SUMMARY TABLES

Summerfruit industry threat summary tables

The information provided in the threat summary tables is an overview of exotic plant pest threats to the summerfruit industry (including the canned fruits industry). More than 260 exotic plant pests were identified. Summarised information on entry, establishment and spread potentials and economic consequences of establishment are provided where available. Pests under official control[171] or eradication may be included in these tables where appropriate. However, summerfruit pests that are established but regionalised within Australia are not covered by TSTs but may be assessed in state biosecurity plans. Assessments may change given more detailed research and will be reviewed with the biosecurity plan.

Full descriptions of the risk rating terms can be found on page 63. An explanation of the method used for calculating the overall risk can be found on the PHA website[172]. Additional information on a number of the pests listed in the TSTs can be found in pest-specific information document (Table 5).

[171] Official control defined in ISPM No. 5 as the active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests

[172] Available from **www.planthealthaustralia.com.au/biosecurity/risk-mitigation**

Invertebrates

Table 21. *Summerfruit invertebrate threat summary table.*

This table includes pests of leviable summerfruit species; Prunus persica *(peach),* Prunus persica var. nucipersica *(nectarine),* Prunus domestica *(plum),* Prunus armeniaca *(apricot)*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
ACARI (Mites e.g. spider and gall mites)										
Amphitetranychus viennensis (syn.*Tetranychus viennensis*)	Hawthorn spider mite, sweet cherry spider mite	Rosaceae including apricot, plum, peach, Japanese plum, Japanese apricot tree, almond, apple, pear, hawthorn, cherry, sweet cherry and raspberry, cotton, fig, hazel and mountain ash	Leaves, bark, flowers[173]	Infested plant material (fruit, bark, leaves, stems) machinery and hitchhiking. Wind dispersal for localised spread[174]	Asia and Europe	LOW	MEDIUM	HIGH	MEDIUM	**LOW**
Cenopalpus pulcher	Flat scarlet mite	Apple, European pear, quince, loquat, walnut, apricot, pomegranate, willow, oriental sycamore (*Platanus orientalis*), plum	Leaves	Infested plant material.	Europe, Africa, western Asia and North America.	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[173] Heavy infestation of *A. viennensis* may cause water loss, leaf chlorosis, premature leaf drop, impair fruit formation, and lower the resistance of the host to winter conditions
[174] Crawling is the main means of dispersal, wind dispersal over longer distances. May also be vectored by birds, large insects and animals

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Eotetranychus carpini (syn. *Tetranychus carpinis, Eutetranychus carpini, Schizotetranychus carpini)*	Yellow mite, yellow spider mite, yellow vine mite	Chestnut, grapevine and plum, raspberry, hazelnut	Leaves, old and young shoots	Infested plant material, soil and machinery. Can be transported in wind currents.	Europe, USA	MEDIUM	MEDIUM	MEDIUM-HIGH	LOW	**VERY LOW**
Eotetranychus kankitus	Miyake spider mite, citrus yellow mite	Primary hosts are Citrus spp., other hosts are grapevine, apricot, pear, *Rosa* spp., willows, *Eleusine indica*	Leaves, stems, fruit	Infested plant material, soil and machinery. Can be spread by wind and rain for localised dispersal.	China, India and Japan.	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**
Eotetranychus lewisi	Lewis spider mite	Wide host range, papaya, citrus, grape, castor bean, poinsettia, clover, peach, *Rosa* species	Leaves, fruit	Infested plant material, soil and machinery. Can be transported in wind currents.	Africa, North America, Central America and Caribbean, South America, Europe (Portugal)	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**
Oligonychus perseae	Persea mite	Avocado, citrus, apricot, peach, nectarine, plum, persimmon, grapes, sumac and liquidambar trees, roses and acacia	Leaves[175]	Infested plant material. Local dispersal by crawling and ballooning.	Mexico, Costa Rica, Israel, Spain, USA, Portugal	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[175] Can cause necrotic lesions on leaves and defoliation in severe cases, leading to reductions in fruit size and yield, and fruit drop

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Tetranychus canadensis	Four spotted spider mite	Chestnut, Corylus, damson, grapevine, apple, plum, peach, *Prunus* sp., populus, *Rubus* sp., tomato, ornamentals	Leaves[176]	Infested plant material, and hitchhiking. Wind dispersal for localised spread.	Canada, USA, Hungary, Poland, Middle East, Africa	LOW	LOW	MEDIUM	LOW	**NEGLIGIBLE**
Tetranychus cinnabarinus	Carmine spider mite	Okra, peanut, papaya, watermelon, citrus, cucurbits, strawberry, cotton, sweet potato, tomato, apple, cassava, banana, beans, peach, onion	Leaves	Infested plant material, and hitchhiking. Wind dispersal for localised spread.	Asia, Africa, North America, South America, Europe, Central America and Caribbean	LOW	LOW-MEDIUM	MEDIUM	LOW	**VERY LOW-NEGLIGIBLE**
Tetranychus mcdanieli	McDaniel spider mite	Apple, pear, sweet and sour cherry, prune, peach and apricot, squash, asparagus, alfalfa, clover, grape, over 30 species of weeds	Leaves and fruit	Infested plant material and hitchhiking. Wind dispersal for localised spread.	USA, Canada	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**

[176] Causes defoliation.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Tetranychus pacificus	Pacific spider mite	Walnut, melon, soybean, common bean, grapevine, Gallini cotton, Bourbon cotton, *Prunus* spp., apricot, plum, peach, almond, Japanese plum, citrus, *Rubus* species, apples and pears	Leaves	Infested plant material and hitchhiking. Wind dispersal for localised spread.	Canada, Mexico, United States	LOW	HIGH	HIGH	HIGH	**MEDIUM**
Tetranychus turkestani (syn. *T.atlanticus)*	Strawberry spider mite	Wide host range including apple, European pears, cotton, roses, grape, peanut, soybean, quince, strawberry, cherry, plum, peach, raspberry, capsicum, tomato, eggplant, olive, *Acacia* species	Leaves	Infested plant material, and hitchhiking. Wind dispersal for localised spread.	China, Japan, Iran, Iraq, USA, Bulgaria, Russia.	LOW	LOW	LOW	LOW[177]	**NEGLIGIBLE**
Tetranychus viennensis (syn. *Amphitetranychus viennensis*)	Hawthorn spider mite, sweet cherry spider mite	Wide host range including apple, raspberry, cherry, peach, apricot and plum	Leaves, fruit	Infested plant material (leaves, bark, fruit, above ground plant material) and hitchhiking. Wind dispersal for localised spread.	Asia and Europe	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[177] Damaging species but not serious pest on summerfruit.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
DIPTERA (Flies and midges)										
Anastrepha fraterculus	South American fruit fly	Wide host range including Myrtaceae (preferred hosts), *Citrus* spp., *Prunus* spp. (especially peach), apricot, plum, guava, mango, apple, *Coffea arabica*, walnut, European olive, almond, European pear and grape	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil [178]	Mexico, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Trinidad and Tobago, Argentina, Bolivia, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela.	LOW	HIGH	HIGH	HIGH	**MEDIUM**
Anastrepha ludens	Mexican fruit fly	Wide host range including cashew nut, citrus, *Coffea arabica*, apple mango, avocado, passionfruit, avocado, peach and pear	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil [178]	Mexico, USA, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama	MEDIUM	HIGH	HIGH	HIGH	**HIGH**

[178] Adults of *Anastrepha* spp. can fly up to 135 km. In international trade, the major means of dispersal is the transport of fruit containing live larvae.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Anastrepha serpentina	Sapodilla fruit fly, Sapote fruit fly	Wide host range including sapodilla, citrus, peach, apple, passionfruit, cherry, mango, avocado	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil [178]	Mexico, Belize, Costa Rica, Guatemala, Honduras, Netherlands, Antilles, Panama, Trinidad and Tobago, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, Venezuela	MEDIUM	HIGH	HIGH	HIGH	**HIGH**
Anastrepha striata	Guava fruit fly	Wide host range including passionfruit guava, mango, cassava, peach, citrus. Primarily a pest of guava.	Fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight over long distances. Pupariation is in the soil [178]	Mexico, USA, Central America and Caribbean, South America	MEDIUM	HIGH	HIGH	HIGH	**HIGH**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Anastrepha suspensa	Caribbean fruit fly	Wide host range, preferred hosts are peach, guava, *Eugenia uniflora* (Surinam cherry), *Syzygium jambos* (roseapple), *Terminalia catappa* (tropical almond), other hosts include citrus, papaya, mango, pear, plum apple, Japanese plum	Fruit	Infested plant material, soil and machinery. Adults capable of flight.	USA, Central America and Caribbean, South America (French Guiana)	MEDIUM	HIGH[179]	HIGH	MEDIUM-HIGH	**MEDIUM-HIGH**
Bactrocera correcta	Guava fruit fly	Wide host range including, citrus, melon, mango, cherry, peach, sapodilla, cashew nut, jujube, *Syzygium* spp.	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Bhutan, China, India, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**
Bactrocera curvipennis	Banana fruit fly	Wide host range including citrus spp., mango, papaya, tomato, nectarine, peach, plum, *Coffea arabica*, sweet pepper, strawberry	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	New Caledonia, Vanuatu	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**

[179] *A. suspensa* derives from tropical wet forest habitats and could potentially become established in many areas of Asia, Australia or Africa

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Bactrocera dorsalis (syn. *B. invadens*, *B. papayae*, *B. philippinensis*)[180]	Oriental fruit fly, Philippine fruit fly, Invasive fruit fly, Asian papaya fruit fly	150 kinds of fruit and vegetables, including apricot, avocado, banana, citrus, coffee, fig, guava, loquat, mango, roseapple, papaya, passionfruit, peach, pear, persimmon, pineapple, surinam cherry and tomato.	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.[181]	Widespread within Asia, Africa, USA, Palau, Papua New Guinea	HIGH	HIGH	HIGH	HIGH	**HIGH**
Bactrocera facialis	Tongan fruit fly, tropical fruit fly	Wide host range including citrus spp., mango, papaya, avocado, passionfruit, peach, capsicum, tomato, cashew nut	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Tonga	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**
Bactrocera psidii	South sea guava fruit fly	Mango, pomelo, cashew, fig, custard apple, granadilla, guava, papaya, carambola, peach, plum, grape	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	New Caledonia	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**

[180] *Bactrocera dorsalis*, *B. invadens*, *B. papayae* and *B. philippinensis* have been condensed into one species *B. dorsalis*.
[181] Adult flight and the transport of infected fruit are the major means of movement and dispersal to previously un-infested areas.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Bactrocera trivialis	New Guinea fruit fly	Grapefruit, sweet orange, chilli, peach, guava, mango, tropical almond	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Indonesia, Papua New Guinea	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**
Bactrocera zonata	Peach fruit fly	Wide host range including citrus, papaya, mango, peach, guava, pomegranate, apple, potato and fig	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Bhutan, Sri Lanka, India, Pakistan, Thailand, Vietnam, Mauritius, Egypt, UAE	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**
Ceratitis quinaria	Five-spotted fruit fly, Rhodesian fruit fly, Zimbabwean fruit fly	Guava, mangoes, cashew, peach and apricot	Fruit	Infested plant material. Adults capable of flight.	Asia (Yemen), Africa	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**
Ceratitis rosa	Natal fruit fly	Wide host range including Citrus spp., coffee, apple, apricot, avocado, mango, blackberry, nectarine, peach, plum, papaya, tomato, grape, pear	Fruit	Infested plant material, adults capable of flight.[182] Larvae pupate in the soil.[183]	Southern and eastern Africa.	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**

[182] Adults tend to remain in the area of emergence, flight is rarely more than a few hundred metres
[183] Introduction through soil that includes puparia could theoretically be possible, but there are no records or such introductions for this or similar fruit fly species.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Drosophila suzukii	Spotted wing drosophila	Wide host range including, apple, blueberry, blackberry, grapes, strawberry, peach, raspberry, cherry, plum, persimmon, pear, nectarine, apricot	Fruit, inflorescence	Infested plant material. Adults are capable of flight.	Asia, the Americas and Europe	HIGH	HIGH	HIGH	HIGH	**HIGH**
Rhagoletis completa	Walnut husk fly	Walnuts including *Juglans nigra*, *J. californica* and *J. hindsii,* and peaches	Fruit	Infested plant material (fruit), soil and hitchhiking. Adults capable of flight over short distances. Pupation is in the soil.[184,185]	USA, Mexico, Europe	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**
Rhagoletis indifferens	Western cherry fruit fly	Sweet cherry, sour cherry, bitter cherry tree, mahaleb cherry, chokecherry, black hawthorn, cherry laurel, klamath plum, apricot, Japanese plum, myrobalan plum.	Fruit	Infested plant material (fruit containing live larvae), soil and hitchhiking. Adults capable of flight. Pupae are soilborne.[184]	North America (Canada, USA)	LOW - MEDIUM	LOW	MEDIUM	MED-HIGH	**VERY LOW - MEDIUM**

[184] *Rhagoletis* species are not known to fly more than a short distance.
[185] Adult flight and the transport of infected fruit are the major means of movement and dispersal to previously uninfected areas

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Rhagoletis pomonella	Apple maggot fly	*Malus* spp., *Prunus* spp., including cherry, apricot, plum and peach	Fruit	Infested plant material (fruit), soil and hitchhiking. Adults capable of flight over short distances. Pupation is in the soil.[184]	USA and Canada	LOW	HIGH	HIGH	HIGH	**MEDIUM**
***Zeugodacus cucurbitae* (syn. *Bactrocera cucurbitae*)**	Melon fruit fly	Melon, citrus, pumpkin, fig, mango, avocado, common bean, peach, tomato	Fruit	Infested plant material (including fruit), soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Southeast Asia, India, China, northern Africa, Papua New Guinea, Mariana Islands, Hawaiian Islands, Solomon Islands, Indonesia and East Timor.	MEDIUM	MEDIUM-HIGH	MEDIUM-HIGH	HIGH	**MEDIUM-HIGH**
COLEOPTERA (Beetles and weevils)										
Anthonomus quadrigibbus	Apple curculio	Sour cherry, peach, apple, pear, quince	Leaves, flowers, fruit	Infested plant material (including fruit), soil and machinery. Adults capable of flight.[186]	North America (Canada, USA, Mexico)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[186] The adults are strong fliers and can disperse the species locally

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Apate monachus	Black borer	Olive, coffee, apple, mango, peach, guava, pomegranate, pear, cocoa, citrus	Stems[187]	Infested plant material. Adults capable of flight.	Central and South America, Africa, Europe, Asia	LOW-MEDIUM	MEDIUM	LOW	LOW[188]	**NEGLIGIBLE**
Aromia bungii	Red necked longicorn, peach red necked longhorn, peach musk beetle	Main host plants are *Prunus* species (including apricot, peach, plum and cherry), myrobalan plum, Japanese plum, Japanese apricot tree, Japanese bush cherry tree, citrus species, walnut, olive, oak, willow, popular, *Azadirachta indica, Bambusa textilis, Pterocarya stenoptera, Schima superba*, persimmon, pomegranate.	Trunk, branches, fruit[189]	Infested plant materials including woody packaging and nursery stock. Adults capable of flight	Asia (China, Japan, Korea, Taiwan, Vietnam), Europe (Italy, Russia)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[187] Adults bore into the wood of trees, which can result in death of young trees, and reduced growth of older trees
[188] *A. monachus* is considered a pest with secondary economic impact and is not usually a serious pest of growing trees
[189] Larvae tunnel between sap wood and heart wood, adult emergence holes is a sign of old establishment. Several generations can develop in one tree, which may lead to its death. Trees are weakened from infestation and susceptible to diseases, decrease in fruit yield results

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Capnodis tenebrionis	Flatheaded root borer, peach capnodis	Almond, apricot, cherry, nectarine, peach, plum	Roots (larvae), Shoots, buds, leaves (adult beetle)	Infested plant material. Adults capable of flight.	Israel, Turkey, Spain, Italy, Hungary, Slovakia, South Moravia	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Carpophilus nepos (syn. *Carpophilus freemani)*	Dried fruit beetle	Date-palm, peach, maize	Fruit	Infested plant material. Adults capable of flight. Larvae pupate in the soil.[190]	USA	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
Chrysobothris mali	Pacific flatheaded borer	Seventy or more woody plants are hosts including various fruit, *Acer*, *Alnus*, *Betula*, *Populus*, *Quercus*, *Salix*, apple, pear, peach, apricot, plum, prune and cherry	Bark, trunk, branches, leaves[191]	Infested plant material, adults capable of flight.	USA, Canada	LOW	LOW	LOW	MEDIUM	**VERY LOW**

[190] Dried fruit beetles are strong fliers and can travel several kilometres in search of hosts.
[191] Adult feeding may cause some defoliation, but the major damage is caused by larvae which kill or weaken trees by girdling the trunks and lower branches. Flatheaded wood borers attack weakened or stressed plants. A single larva is capable of girdling and killing a young tree.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Conotrachelus nenuphar	Plum curculio, American plum weevil, peach curculio	Strawberry, apple, stone fruit, apricot, sweet cherry, sour cherry, plum, peach, nectarines, European pear, blueberry, grapevine[192]	Flowers, leaves, fruit	Infested plant material.	Canada and USA	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Cotinis mutabilis	Fig beetle, Fig eater beetle, Green fruit beetle	Pineapple, tomato, peach, nectarine, fig, plum, apricot	Fruit, roots	Infested soil and plant material. Adults are capable of flight (over long distances). Eggs and pupae are soil borne	North America, Mexico, Central America into northern South America	LOW	LOW	LOW	MEDIUM	**VERY LOW**
Cotinis nitida	Green june beetle	Apple, plum, peach, turf grasses and grapevine	Fruit	Infested soil and plant material. Adults are capable of flight. Pupae are soil borne	USA	LOW	LOW	MEDIUM	MEDIUM	**VERY LOW**
Curculio nucum	Hazelnut weevil, nut weevil	Hazelnut, pear, peach, kaki (*Diospyros kaki*) and more rarely apple, plum and cherry.	Fruit, leaves	Infested plant material, soil and machinery. Larvae are soilborne	Europe	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**

[192] Peaches, apricots and nectarines are the preferred hosts of *C. nenuphar* but apples are also widely affected

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Harmonia axyridis	Harlequin ladybird, multicoloured ladybird	Pumpkin, apple, pear, plum, peach, raspberry and grape	Fruit	Infested plant material (above ground plant parts including fruit and timber), and hitchhiking. Adults capable of flight over long distances.	Asia, North America, South America, Europe and New Zealand	LOW	LOW[193]	MEDIUM - HIGH	LOW	**NEGLIGIBLE**
Lasiodactylus pictus (syn. *Phenolia pictus, Lasiodites pictus*)	Sap beetle	Pineapple, plum, citrus, apple	Fruit	Infested plant material.	Asia	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Magdalis gracilis	Black fruit tree weevil	Apple, apricot, peach, pear, plum, prune, willow	Leaves	Infested plant material and hitchhiking.	USA	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[193] Has established in many countries where introduced. It reproduces in both warm and cool climates and it is well adapted to winter temperatures below freezing and to summer temperatures up to 30°C.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Megaplatypus mutatus (syn. *Platypus mutatus, P. sulcatus*)	Ambrosia beetle	Wide range of woody trees, sour cherry, apple, citrus, peach, avocado, European pear, *Acer* spp., *Eucalyptus* spp., *Fraxinus* spp., bay tree (*Laurus nobilis*), *Magnolia grandiflora*, *Platanus* spp., *Populus* spp., *Quercus* spp., black locust (*Robinia pseudoacacia*), willow, elm, common hazel	Trunk, branches	Infested plant material (timber/seedlings) and hitchhiking. Adults capable of flight over short distances.[194]	South America, Europe (Italy)	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**
Melalgus confertus	Branch and twig borer, prune branch borer	Cherry, almond, strawberry tree, peach, prune	Twigs, branches [195]	Infested plant material. Adults capable of flight.	USA and Canada	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Myllocerus undecimpustulatus	Sri Lankan weevil	Wide host range including, sugarcane, mango, pomegranate, citrus, peach, lychee, eggplant, oak, cotton	Leaf and roots[196]	Infested plant material, soil and machinery	USA, Sri Lanka, Pakistan, India	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[194] Adults are dispersed locally *via* flight, generally 50-100 m from the emergence hole
[195] A borer that enter via wounds, often dead or dying parts of plants
[196] The larvae of this weevil burrow in the soil, feeding on the roots of their host plants

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Naupactus xanthographus	South American fruit tree weevil	Citrus, apple, olive, avocado, apricot, plum, peach, almond, grape	Leaf and roots[197]	Infested plant material, soil and machinery. Pupae are soilborne.	South America (Argentina, Chile, Uruguay)	LOW	LOW	MEDIUM	MEDIUM	**VERY LOW**
Otiorhynchus armadillo	Armadillo weevil	Alders, camellia, nut trees (including chestnut and hazelnut), beech, ivy, holly, juniper, bay, olive, spruce, pine, Pittosporum, plum, azalea, Rubus, willow, elder and yew	Leaves, stems and flower (by adults), roots (by larvae)	Infested plant material, soil and machinery. Eggs are soilborne[198]	Asia (Turkey), Europe	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Otiorhynchus clavipes	Red-legged weevil	Wide host range including gooseberry, raspberry, currant, plum, strawberry, apple and grapevine	Leaves, buds, fruitlets, flowers (adults) roots (larvae)	Infested plant material, soil and machinery. Eggs are soilborne	Europe	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[197] Adults are flightless weevils. Larvae damage the roots and adults damage foliage.
[198] *O. armadillo* is unable to fly. Natural dispersal by adults is by walking.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Popillia japonica	Japanese beetle	Wide host range including, birches, plum, chestnuts, stone fruit, *Rubus*, grape, willow, turfgrasses, citrus, apple, peach, nectarine, raspberries, quince	Leaves, flowers, fruits, roots[199]	Infested plant material (whole plant), soil and hitchhiking. Adults capable of flight over long distances. Eggs are soilborne.	Japan, Canada, USA, Portugal	HIGH	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Popillia quadriguttata	Scarab beetle, White grub.	Wide host range including, lychee, longan, peach, pear, corn, soybean, turf grasses, Asian hazel, sweet potato, raspberry	Leaves, flowers, fruit (adults), roots (larvae)	Infested plant material (whole plant), soil and hitchhiking. Adults capable of flight.	East Asia (North Vietnam, China, Taiwan, to Korea), Russia	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Potosia brevitarsis	White spotted flower chafer	Wide host range including, lychee, grape, corn, sunflower, peach	Leaves, flowers, fruit	Infested plant material, soil and hitchhiking.	Europe, China, Korea	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Rhynchites auratus	Apricot weevil	Prunus sp., apricot, plum, cherry, walnut, apple	Fruit, flowers, leaves	Infested plant material (fruit), soil and hitchhiking. Adults capable of flight. Pupation is in the soil.	Central and Southern Europe, Eurasiatic.	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[199] Larvae feed on roots, with skeletonized foliage is the most common symptom of feeding by the adult. Adults also feed on the fruit, making them unmarketable.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Scolytus rugulosus	Shot hole borer	Quince, apple, medlar, *Prunus* species, Japanese pear, apricot, almond, peach	Bark, branches, trunk, leaves[200]	Infested plant material (including timber, branches and pruning's), soil and hitchhiking. Adults capable of flight.	Asia, Africa, North America, South America, Europe.	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Syneta albida	Fruit tree leaf beetle, Syneta beetle	Cherry, pear, plum, prune, apple, various nut trees including hazelnut	Fruit, shoots, flowers, leaves (adults), roots (larvae)	Infested plant material, soil and hitchhiking. Eggs/larvae are soilborne.	USA	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Trachys inconspicua	Prunus leafminer beetle		Leaf	Infested plant material. Adults capable of flight.	Japan, Taiwan	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Xyleborus dispar	Pear blight beetle, European shothole borer, ambrosia beetle	Wide host range that includes eucalypts and deciduous trees, hazelnut, apple, *Prunus amygdalus*, apricot, sweet cherry, sour cherry, plum, peach, nectarine, European pear, grapevine, oak, maple, birch, poplar, alder	Stems, branches, whole plant (wilting)[201]	Infested plant material. Female adults capable of flight over relatively long distances.[202]	Europe, North America, and parts of Asia, Africa (Algeria, Morocco, Tunisia)	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[200] Infested trees are usually weak and will be further weakened by the damage. Eventually, the tree will be girdled and killed.
[201] Larvae are borers that are more likely to attach stressed trees.
[202] Adult females fly readily and flight is one of the main means of movement and dispersal to previously uninfected areas.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Xylosandrus germanus	Black timber bark beetle, Ambrosia beetle	Wide host range including, fir, sycamore, alder, birch, tea, pecan, hairy chestnut, persimmon, beech, walnut, apple, spruce, pine, apricot, cherry, oriental pear, oak, elm, grapevine[203]	Roots, stems and leaves	Infested plant material. Female adults capable of flight over relatively long distances[204]	Asia, Europe, USA, Canada	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)										
Adelphocoris lineolatus	Lucerne bug	Apricot, peach, beetroot, soybean, sunflower, lupin, pear, potato, wheat and Lucerne (main host).	Leaves, shoots, flowers, fruit	Adults capable of flight over short distances	Asia (Azerbaijan, China, Iran, Japan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Uzbekistan), Europe (widespread), North America (USA, Canada)	LOW	MEDIUM	HIGH	HIGH	**MEDIUM**
***Aguriahana stellulata* (without Cherry X disease)**	Cherry leafhopper	Plum, cherry, pear, elm, hickory, popular	Leaves	Infested plant material. Adults capable of flight.[205]	Europe, New Zealand	LOW	MEDIUM	MEDIUM	LOW[206]	**VERY LOW**

[203] 200 host species belonging to 51 plant families, it will attack almost any woody plant stem which is in a suitable condition
[204] The male adults of *X. germanus* are flightless, but the females can disperse by flight over relatively long distances
[205] Major vector for Cherry X disease
[206] Severe leaf mottling on cherry. Usually little or no economic importance

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Aguriahana stellulata* (with Cherry X disease)**	Cherry leafhopper	Plum, cherry, pear, elm, hickory, popular	Leaves	Infested plant material. Adults capable of flight.[205]	Europe, New Zealand	LOW	MEDIUM	MEDIUM	MEDIUM[206]	**LOW**
Amblypelta cocophaga	Coconut bug	Papaw, *Ceiba pentandra*, papaya, coconut, mango, pawpaw, melon, kapok, navel orange, cassava, peach, sugarcane, cocoa, Macaranga, *Eucalyptus deglupta*, *Passiflora quadrangularis* and winged bean	Stems, shoots and fruit	Infested plant material. Adults capable of flight[207].	Singapore, Fiji, Papua New Guinea, Solomon Islands	HIGH	HIGH	HIGH	LOW[1]	**LOW**
Apodiphus amygdali	Pistachio bug	Pistachio, apple, apricot, pear, plum, olive, poplar, pine, plane-tree, elm, willow	Leaves, fruits, flowers and stems	Infested plant material. Adults capable of flight.	Europe and the Middle East	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Boisea rubrolineata	Boxelder bug	Blackberry, ash, box elder, maple, almond, apple, cherry, peach, pear, and plum trees, grapes[208]	Leaves, flowers, fruit	Infested plant material, adults capable of flight over short distances[209]		LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[207] Adults are capable of active flight and are easily disturbed. Nymphs are active crawlers.
[208] Main host is the box elder tree (*Acer negundo*), but also can feed on the fruit of almond, apple, cherry, peach, pear, and plum trees, and on grapes, causing the fruit to become deformed
[209] Winged adults can fly for distances of several blocks

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Brachycaudus amygdalinus	Almond leaf curl aphid, Short tailed almond aphid	Almond, peach, sweet cherry, European pear	Leaves	Infested plant material, soil and machinery, adults capable of flight.	Central and western Asia, eastern Africa and southern Europe.	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
***Brachycaudus schwartzi* (with *Plum Pox virus*)**[210]	Almond aphid, Peach curl aphid, peach aphid	Apricot, peach, plum, nectarine	Leaves, shoots	Infested plant material and machinery, adults capable of flight[211]	Egypt, Peru, Italy, India, Iran, USA, Tunisia, Bulgaria	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
***Brachycaudus schwartzi* (without *Plum Pox virus*)**[210]	Almond aphid, Peach curl aphid, peach aphid	Apricot, peach, plum, nectarine	Leaves, shoots	Infested plant material and machinery, adults capable of flight[211]	Egypt, Peru, Italy, India, Iran, USA, Tunisia, Bulgaria	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
***Carneocephala fulgida* (syn. *Xyphon fulgidum*) (without *Xylella fastidiosa*)**[212]	Redheaded sharpshooter	Prefers grasses and certain annual weeds for breeding and feeding, grapevine			USA	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
***Carneocephala fulgida* (syn. *Xyphon fulgidum*) (with *Xylella fastidiosa*)**[212]	Redheaded sharpshooter	Prefers grasses and certain annual weeds for breeding and feeding, grapevine			USA	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Ceresa alta	Buffalo treehopper	Wide host range, apple, stonefruit, sweet cherry, almond, peach, pear, grape	Leaves and stems	Infested plant material	Asia, North America, Europe	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**

[210] Vector of *Plum pox virus*
[211] The feeding of *B. schwartzii* causes severe curling of peach leaves, disrupts bud development and young infested fruit may drop
[212] Is a vector for *Xylella fastidiosa*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Ceroplastes japonicus	Tortoise wax scale, Japanese wax scale	Wide host range including, peach, Japanese apricot tree, sweet cherry, sour cherry, citrus, tea, quince, mulberry, kiwi, fig, guava, pomegranate, persimmon, mango, ornamental apples, European pear, Oriental pear tree, elm, ivy, holly, willow, *Buxus* sp., sweet bay, oleander, myrtle, maple, *Magnolia* species	Leaves, stems, branches, fruit[213]	Infested plant material and hitchhiking[214]	Europe (Croatia, France, Germany, Hungary, Italy, Russia, Slovenia), Asia (China, Korea, Japan, Nepal, Turkey, Armenia, Azerbaijan, Georgia)	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**

[213] Pest attacks fruit and stems, sucking sap and excreting large amounts of honeydew which can cause black fungus to cover the surface of plants. The stress on the plant results in reduced yield and fruit quality. Heavy infestation can lead to death of branches and sometimes entire plants

[214] Males are winged but are poor fliers. The main dispersal stage is the first instar, which can be naturally dispersion over short distances by wind.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Chinavia hilaris (syn. *C. hilare, C. halaris, Nezara hilaris, Acrosternum hilaris, Acrosternum hilare, Pentatoma hilaris)*	Green stink bug, green solider bug	Wide host range including, apricot, plum, peach, Japanese plum, sweet cherry, soybean, apple, asparagus, beans, maize, cotton, aubergine, pea, pear, tobacco, tomato, pistachio, citrus, lucerne, cabbage, strawberry, raspberry, grapevine	Pods, seeds, buds, fruit, leaves[215]	Infested plant material. Adults capable of flight [216]	North America (Canada, US), South Asia (Pakistan)	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
***Colladonus montanus* (with *Candidatus* Phytoplasma pruni, peach X disease)**[217]	Mountain leafhopper	Apricot, plum, peach, sweet cherry, European pear	Leaves, fruit	Infested plant material. Adults capable of flight[218]	North America (USA)	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
***Colladonus montanus* (without *Candidatus* Phytoplasma pruni, peach X disease)**[217]	Mountain leafhopper	Apricot, plum, peach, sweet cherry, European pear	Leaves, fruit	Infested plant material. Adults capable of flight[218]	North America (USA)	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[215] Damage depends on the host and fruit stage. Causes catfacing injuries to peach fruit
[216] Dormant on deciduous trees and overwinter under leaves, so could be transported in leaves
[217] Is a vector of *Candidatus* Phytoplasma pruni (peach X disease, cherry X disease)
[218] For *C. montanus*, the probability to infect peach orchards is greater in areas where sugarbeet or other dicotyledonous plants are present because this vector overwinters and multiplies on these plants.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Cuerna costalis* (with *Xylella fastidiosa*)**[219]	Leafhopper, sharpshooter leafhopper	Peach, *Prunus angustifolia* (chickasaw plum), grapevine, strawberry, turnip, beet, peanut, blue lupine, garden pea, cowpea, cotton, grasses, wheat, maize, trumpet creeper (*Campsis radicans*), red bud (*Cercis* sp.), silktree (*Albizzia julibrissin*), Crapemyrtle, privet, *Dahlia* sp, ragweed, sunflower, Bermuda grass (*Cynodon dactylon*), crabgrass, Johnson grass, ryegrass, millet, coffeeweed (*Cassia* sp), hollyhock, okra, evening primrose, pokeweed, dock[220]	Stems, leaves (petioles)	Infested plant material. Adults are capable of flight over short distances[221]	USA, Canada	UNKNOWN	LOW-MED	LOW	HIGH	**UNKNOWN**

[219] Is a vector for *Xylella fastidiosa* and phony peach
[220] Feeds mainly on grasses, low growing herbs, seedlings of herbaceous and wood plants
[221] Fairly sedentary species Large local populations result from failure to disperse because acceptable food is abundant. Disperse only short distances

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Cuerna costalis* (without *Xylella fastidiosa*)**[219]	Leafhopper, sharpshooter leafhopper	Peach, *Prunus angustifolia* (chickasaw plum), grapevine, strawberry, turnip, beet, peanut, blue lupine, garden pea, cowpea, cotton, grasses, wheat, maize, trumpet creeper (*Campsis radicans*), red bud (*Cercis* sp.), silktree (*Albizzia julibrissin*), Crapemyrtle, privet, *Dahlia* sp, ragweed, sunflower, Bermuda grass (*Cynodon dactylon*), crabgrass, Johnson grass, ryegrass, millet, coffeeweed (*Cassia* sp), hollyhock, okra, evening primrose, pokeweed, dock[220]	Stems, leaves (petioles)	Infested plant material. Adults are capable of flight over short distances[221]	USA, Canada	UNKNOWN	LOW-MED	LOW	LOW	**UNKNOWN**
Diaspidiotus africanus	Grey scale	Olive, oleander, peach, pear, plum	Leaves, stems	Infested plant material.	Zimbabwe, Madagascar, South Africa	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Diaspidiotus forbesi	Forbes scale	Wide host range including, plum, peach, nectarine and apricot	Bark of stems and trunks, fruit	Infested plant material.	Canada, Mexico, Puerto Rico, South Africa, United States	LOW	MEDIUM[222]	MEDIUM	LOW	**VERY LOW**
Diaspidotus juglansregiae	English walnut scale, Armoured Scale, Gopher Scale	Wide host range, including *Prunus americana* (American plum), *Prunus serotina* (black cherry), peach, plum, nectarine, sour cherry, firethorn, apple, *Vitis* species and *Rosa* species	Bark of stems and trunks, fruit	Infested plant material[223]	USA	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Dysaphis plantaginea	Rosy apple aphid	Apple, plantain, peach, European pear	Leaves, stems, fruit	Infested plant material. Capable of flight (over short distances).	Asia, North America, South America (Bolivia) and Europe	HIGH	HIGH	HIGH	MEDIUM	**MEDIUM**
Edwardsiana rosae	Rose leafhopper	Raspberry, blackberry, apple, peach, rose and grapevine	Leaves	Infested plant material. Adults capable of flight.	Israel, USA, Hungary	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[222] Found in environments similar to Australia - potential for establishment and spread
[223] Crawlers are the primary dispersal stage and move to new areas of the plant or are dispersed by wind or animal contact. Dispersal of sessile adults and eggs occurs through human transport of infested plant material.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Epidiaspis leperii	European pear scale, Italian pear scale	Plum, peach, American plum, Japanese plum, sweet cherry, walnut, stone fruit, apple, European pear, quince, olive, and currants	Twigs, branches, stems, fruit[224]	Infested plant material (including fruit, bark, stems and leaves) and hitchhiking on agricultural machinery and workers' clothing. Wind dispersal of first instar females[225]	Africa (Algeria, Libya, Morocco, Tunisia), North America (Mexico, USA), South America (Argentina, Chile, Uruguay), Asia (Georgia, Iran, Turkey), Europe (widespread)	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Euschistus servus	Brown stink bug	Various including pecan, peach, maize, sorghum, cotton and soybean	Leaves, fruit, flowers, stems	Infested plant material, soil and machinery. Adults are capable of flight[226]	Canada, USA, Mexico	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
Euschistus tristigmus	Dusky stink bug	Wide host range including soybean, peach	Fruits	Infested plant material and machinery, adults capable of flight.	USA	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**

[224] This scale inflicts its sucking damage on the wood of the tree. Symptoms include distortion of branches, gumosus, and early fruit drop. Light populations of Italian pear scale do not harm trees.
[225] Natural dispersal of *E. leperii* is by the crawling of the first-instar females over short distances. Crawlers can be dispersed by wind, or between orchards on birds' feet
[226] Adults are strong fliers

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Ferrisia gilli	Gill's mealybug	Wide host range including pistachio, almonds, grapes, persimmons, stone fruits, nectarine	Branches, fruit, petioles, leaves	Infested plant material. Adults males are capable of flight.	USA	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**
***Fieberiella florii* (without *Candidatus* Phytoplasma mali)**[227]	Cherry leafhopper, Privet Leafhopper	Apple, cherry, apricot, peach, pear	Above ground plant parts	Infested plant material. Adults are capable of flight.	Europe and North America	UNKNOWN	UNKNOWN	LOW	LOW	**UNKNOWN**
***Fieberiella florii* (with *Candidatus* Phytoplasma mali)**[227]	Cherry leafhopper, Privet Leafhopper	Apple, cherry, apricot, peach, pear	Above ground plant parts	Infested plant material. Adults are capable of flight.	Europe and North America	UNKNOWN	UNKNOWN	LOW	MEDIUM	**UNKNOWN**
Gonocerus acuteangulatus	Box bug	Hazel, hawthorn, buckthorn, yew, oak and plum	Leaves, fruit		Mediterranean, Europe and central Asia	UNKNOWN	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**

[227] Is a vector of *Candidatus* Phytoplasma mali, although it is generally considered to be a poor vector of this pathogen. Limited impact without pathogen.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Halyomorpha halys	Brown marmorated stink bug, Yellow-brown stink bug	Wide host range with over 100 species reported as hosts including: hazelnut, pecan, walnut, cotton, sweetcorn, soybeans, maple, oak, fig, grapes, cherry, peach, olive, vegetable crops, citrus, blueberry, Rubus.	Leaves and fruit[228]	Infested plant material and hitchhiking. Adults capable of flight[229]	Asia, North America, Europe	HIGH	HIGH[230]	HIGH	HIGH	**HIGH**
***Homalodisca vitripennis* (without *Xylella fastidiosa*)**	Glassy-winged sharpshooter	Very broad host range including blackberry, grapevine, citrus, plum, almond, peach, macadamia, pistachio and ornamentals, okra, apricot, cherry	Leaves, stems	Infested plant material. Adults are capable of flight[231]	Mexico, USA, Chile, Cook Islands, French Polynesia	MEDIUM-HIGH	HIGH	HIGH	LOW	**LOW**

[228] *H. halys* is a fruit-piercing stink bug that causes extensive damage to various fruits and soybean
[229] Regularly found in shipping containers.
[230] Ecological niche modelling indicates that the area of invasion suitable for *H. halys* is quite extensive worldwide, and parts of southern Australia show climate suitability

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Homalodisca vitripennis* (with *Xylella fastidiosa*)**	Glassy-winged sharpshooter	Very broad host range including blackberry, grapevine, citrus, plum, almond, peach, macadamia, pistachio and ornamentals, okra, apricot, cherry	Leaves, stems	Infested plant material. Adults are capable of flight[231]	Mexico, USA, Chile, Cook Islands, French Polynesia	MEDIUM-HIGH	HIGH	HIGH	HIGH	**HIGH**
Hyalopterus amygdali	Mealy peach aphid	Almond, peach, apricot, nectarine	Leaves	Infested plant material. Adults are capable of flight	Europe	LOW	HIGH[232]	HIGH	LOW-MEDIUM	**VERY LOW-LOW**
Lygus elisus	Pale legume bug, Lucerne plant bug	Wide host range including apple, European pear, carrot, lucerne, mustards, cucumber, stone-fruit, peach, cotton, tomato	Above ground plant parts, buds, leaves, flowers[233]	Infested plant material. Adults capable of flight[234]	USA, Canada	LOW	HIGH	MEDIUM	MEDIUM	**LOW**

[231] Adult glassy-winged sharpshooters are strong fliers and can move rapidly from plant to plant. Nymphs are wingless and cannot fly but can distribute themselves by walking and jumping through the canopy or dropping from plants and walking to new hosts. Most rapid and long-distance movement is as viable egg masses in nursery stock of either crop or ornamental plants.
[232] Prolific reproduction
[233] Feed on the flower buds (although damage is usually not significant). Significant damage is caused by the bugs feeding directly on the fruit, creating pits and depressions (similar to stink bug damage). Insecticides are available for the management of this pest in the United states. Biological control is also available
[234] Adults are highly mobile and can move up to 15 metres/day

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Lygus hesperus	Western tarnished plant bug	Wide host range including, apple, pear, sugarbeet, tomato, cotton, strawberry bean, grapevine, pistachio, carrot, lucerne, safflower, weeds, stone-fruit, peach, vegetable crops cucumber[235]	Above ground plant parts, Buds, leaves, flowers[233]	Infested plant material. Adults capable of flight.	USA, Canada, Mexico	LOW	HIGH[236]	MEDIUM	MEDIUM	**LOW**

[235] Recorded on 110 hosts
[236] Tarnished plant bug and Western tarnished plant bug are well adapted colonisers that are capable of flying with a full complement of eggs enabling them to exploit new habitats

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Lygus lineolaris	Tarnished plant bug	Wide host range, including apple, European pear, carrot, cherry, cotton, beans, lucerne, soybean, peach, strawberry, *Rubus* spp., tomato, conifers (pine, spruce, Douglas fir and larch), vetch, canola, sunflower, maize, crimson clover, *Aster* spp., chrysanthemum, dahlia, impatiens, carnation[237]	Above ground plant parts, Buds, leaves, flowers[238]	Infested plant material. Adults capable of flight.	Asia (Republic of Georgia), North America, Central America and Caribbean	LOW	HIGH[239,236]	HIGH	MEDIUM[240]	**LOW**

[237] This species has a very wide host range with at least 385 known hosts
[238] Feeds on the flowers, and fruit. Fruit becomes distorted around feeding site.
[239] Australia shares similar environmental conditions to the USA it would be expected that *L. lineolaris* would readily spread across Australia. Natural barriers may limit the natural movement of the pest in certain regions.
[240] Managed overseas using insecticides.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Metcalfa pruinosa	Frosted moth bug, Frosted lightening hopper, Planthopper	Wide host range including, Northern white-cedar (*Thuja occidentalis*), Juniper (*Juniperus communis*) and Rowan (*Sorbus aucuparia*) on *Lilium* spp., plum, peach, apricot, kiwi, olive, grape, oak, fig, Citrus, Ficus, soyabean, *Malus* spp., *Vitis, Prunus*, European pear[241]	Fruit, leaves, buds[242]	Infested plant material and machinery. Adults capable of flight over short distances[243].	South Korea, Bermuda, Canada, USA, Cuba, Jamaica, Puerto Rico, Europe	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Neoaliturus haematoceps	Leafhopper	*Citrus* spp., apricot, sesame, periwinkle, *Matthiola incana*, various weeds	Stems	Infested plant material, soil and machinery	Asia, Africa, Europe	UNKNOWN	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**
***Oncometopia facialis* (without *Xylella fastidiosa*)[244]** (syn. *Oncometopia facilis)*	Sharpshooter	Citrus, sweet almond bush (*Aloysia virgata*), falso boldo (*Vernonia condensata*), coffee, *Lantana camara,* plum	Stems, leaves	Infested plant material. Adults are capable of flight	Bolivia, Brazil, Colombia, Ecuador, Paraguay	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[241] Hardwoods are main hosts.
[242] Symptoms include stunting, honeydew, and spots of waxy filaments on plants. The most severe damage is caused by *M. pruinosa's* honeydew secretions, a substrate of black sooty mould which reduces fruit quality.
[243] Active spread by flight of adult *M. pruinosa* is considered significant only for local dispersal
[244] Vector for *Xylella fastidiosa*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Oncometopia facialis* (with *Xylella fastidiosa*)**[244] (syn. *Oncometopia facilis)*	Sharpshooter	Citrus, sweet almond bush (*Aloysia virgata*), falso boldo (*Vernonia condensata*), coffee, *Lantana camara,* plum	Stems, leaves	Infested plant material. Adults are capable of flight	Bolivia, Brazil, Colombia, Ecuador, Paraguay	LOW	LOW	LOW	HIGH	**LOW**
Parabemisia myricae	Bayberry whitefly, Japanese bayberry whitefly	Wide host range including *Citrus* spp., avocado, cherry, plum, peach, pear, gardenia, *Morus alba*, *Rhododendron* spp., *Salix* spp. Major host plant citrus and *Persea americana* (Avocado pear)	Leaves, stems, fruit[245]	Infested plant material. Adults are capable of flight	Asia, Africa, USA, Guadeloupe, Venezuela, Europe, Papua New Guinea	MEDIUM[246]	HIGH	MEDIUM	HIGH	**MEDIUM**
***Paraphlepsius irroratus* (with X-disease; *Candidatus* Phytoplasma pruni)**[247]	Bespeckled leafhopper, golden-brown leafhopper, irrorate leafhopper	Sweet cherry, peach, chokecherry, nectarine, plum	Leaves	Infested plant material. Wind dispersal	North America (USA)	LOW	LOW	LOW	HIGH	**LOW**

[245] Sticky honeydew deposits accumulate on leaves and stems and usually develop black sooty mould fungus, giving the foliage (even the whole plant) a sooty appearance.
[246] Natural wind dispersal from Papua New Guinea
[247] Vector of X-disease, possibly *Xylella fastidiosa*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Paraphlepsius irroratus* (without X-disease (*Candidatus* Phytoplasma pruni))**[247]	Bespeckled leafhopper, golden-brown leafhopper, irrorate leafhopper	Sweet cherry, peach, chokecherry, nectarine, plum	Leaves	Infested plant material. Wind dispersal	North America (USA)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Parlatoreopsis longispina	Asiatic pomegranate scale	Broad host range including *Agave* spp., Bauhinia, oleander, jasmine, olive, plum, pomegranate, pear, honeysuckle, *Prunus* species, pear, apple, willow, *Acacia* species, *Ficus* species	Leaves	Infested plant material, soil and machinery	Africa, Middle East	MEDIUM	HIGH	HIGH	UNKNOWN	**UNKNOWN**
Parlatoria oleae	Olive scale	Peach, plum, Japanese plum, apple, olive, pistachio, almond, rose, gooseberry, jujube	Above ground plant parts[248]	Infested plant material (limbs, leaves and fruit).	Africa, Europe, Asia, North and South America	MEDIUM	LOW	LOW	MEDIUM	**VERY LOW**

[248] Infests the branches and twigs of the host. Heavy populations result in the defoliation of leaves, and dieback of the limbs. It may cause slight deformations and dark spots on olives, apples and other fruit

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Phenacoccus aceris[249]	Apple mealybug, maple mealybug	Nectarine, peach, apricot, plum, apple, European pear, currants, cherry, grape, gooseberry, blueberry, maple, oak, willow, ash, elm, filbert, pine trees, potato, hibiscus, rose, banana, catalpa, mulberry, honeysuckle, camellia and rhododendron	Stems, leaves, fruit, bark[250]	Infested plant and soil material. Male adults capable of flight.	Asia, Europe, Africa and North and South America	MEDIUM	HIGH[251]	HIGH	MEDIUM	**MEDIUM**

[249] Vector for Little cherry virus 2, Grapevine virus A and B, grapevine leafroll associated virus
[250] Produces honeydew (a high-sugar fluid excrement) that can serve as a substrate for sooty mould
[251] Australian environment would be suitable for establishment. Has a wide host range, but only has a single generation per year.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Philaenus spumarius* (with *Xylella fastidiosa*)**[252]	Meadow froghopper, meadow spittle bug	Infest over 400 species, peach, sweet cherry, almond, raspberry, blackberry, grapevine, olive, wormwood, tarragon, may damage alfalfa, red clover, wheat, oats, corn, strawberries	Stems	Infested plant material. Adults capable of flight over short distances. Wind dispersal.	Africa (Algeria, Morocco, Tunisia), Asia (Afghanistan, Armenia, Azerbaijan, China, Iran, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Syria, Turkey), Europe (widespread), North America (Canada, USA), Oceania (New Zealand)	MEDIUM	MEDIUM	MEDIUM	HIGH	**MEDIUM**

[252] Vector of *Xylella fastidiosa*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Philaenus spumarius* (without *Xylella fastidiosa*)**[252]	Meadow froghopper, meadow spittle bug	Infest over 400 species, peach, sweet cherry, almond, raspberry, blackberry, grapevine, olive, wormwood, tarragon, may damage alfalfa, red clover, wheat, oats, corn, strawberries	Stems	Infested plant material. Adults capable of flight over short distances. Wind dispersal.	Africa (Algeria, Morocco, Tunisia), Asia (Afghanistan, Armenia, Azerbaijan, China, Iran, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Syria, Turkey), Europe (widespread), North America (Canada, USA), Oceania (New Zealand)	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Pseudococcus comstocki	Comstock mealybug	Wide host range including apple, European pear, Asian pear, banana, citrus, peach, lemon, apricot, cherry, coffee, *Morus* spp., *Catalpa* spp., fig, mulberry, Variety of ornamental (e.g. *Lilium* spp., *Hypericum* sp., *Prunus laurocerasus*, *Viburnum tinus*), *Prunus* spp., pomegranate, Japanese pear	Leaves, stems, fruits, roots[253].	Infested plant material (including fruit), soil and hitchhiking. Male adults capable of flight over short distances. Wind dispersal of crawlers over short distances[254]	Asia, Europe, Africa, North America and South America.	MEDIUM	UNKNOWN	UNKNOWN [255]	LOW	**UNKNOWN**

[253] Nymphs and young adult females excrete a huge amount of honeydew that drops on leaves and fruits below on which usually a dense sooty mould develops
[254] Females hide in the fruit stem cavity on peaches and can be spread long distances with infested fruit
[255] The Australian climate is likely to be conducive for the spread of this pest.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Pseudococcus maritimus* (without *little cherry disease)	Grape mealybug, baker's mealybug, pear mealybug, vine mealybug	Over 80 hosts, including *Citrus* spp., apple, damson, peach, plum, pear, grapevine, cherry[256]	Leaves, stems, bark, fruit[257]	Infested plant material (including fruit), soil and hitchhiking. Male adults capable of flight over short distances. Wind dispersal of crawlers over short distances[258]	Europe, Asia, New Zealand, North and South America, Indonesia	MEDIUM – HIGH	MEDIUM - HIGH	MEDIUM[259]	LOW	**VERY LOW-LOW**
Pseudococcus maritimus* (with *little cherry disease)	Grape mealybug, baker's mealybug, pear mealybug, vine mealybug	Known from over 80 hosts, including citrus spp., apple, damson, peach, plum, pear, grapevine, cherry[256]	Leaves, stems, bark, fruit[257]	Infested plant material (including fruit), soil and hitchhiking. Male adults capable of flight over short distances. Wind dispersal of crawlers over short distances[258].	Europe, Asia, New Zealand, North and South America, Indonesia	MEDIUM – HIGH	MEDIUM - HIGH	MEDIUM - HIGH[259]	MEDIUM	**LOW-MEDIUM**
Pterochloroides persicae	Peach black aphid	Almond, quince, apple, apricot, peach, plum, cherry, citrus, pear	Bark, branches [260]	Infested plant material, soil and hitchhiking. Adults capable of flight.	Europe, Asia, Africa, the Middle East	LOW	MEDIUM	MEDIUM	MEDIUM-HIGH[261]	**LOW-MEDIUM**

[256] Grapes and pears are primary hosts
[257] Produce large amounts of honeydew that damage the fruit and foliage, resulting in unmarketable fruit.
[258] Long range dispersal of adults or nymphs may occur through wind-assistance, propagation material or on fruit. Adult males are winged, fragile and short-lived. Crawlers can be spread several hundred metres by wind.
[259] The Australian climate is likely to be conducive for the spread of this pest.
[260] Sap sucking from the bark and branches causes fruit drop, weakens the trees and can kill trees over an extended period of heavy infestation. Excretes large amounts of honeydew which can be infected by sooty mould
[261] Is a serious pest of peach and related fruits particularly in the Middle East

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Scaphytopius acutus[262]	Leafhopper	Citrus, peach, common choke cherry tree, blueberries, *Rubus*, tomato, potato, apple, pear, grapevine, strawberry, grain crops	Leaves	Infested plant material.	USA and Canada	UNKNOWN	UNKNOWN	MEDIUM	HIGH	**UNKNOWN**
Scaphytopius nitridus[263]	Leafhopper	Wide host range including Citrus spp., rice, barley, corn, sugarcane, wheat, sorghum, apple, pear, grapevine, carrot, potato, tomato, papaya, peach, strawberry, *Rubus* spp., ornamentals and weeds	Leaves	Infested plant material, soil and hitchhiking.	USA	UNKNOWN	UNKNOWN	MEDIUM	HIGH	**UNKNOWN**

[262] Vector of six viruses, including western x-disease virus of peach and cherry, and eastern x-disease of peach and cherry
[263] Vector of Western X-disease phytoplasma 16SrIII-A

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Sphaerolecanium prunastri	Plum scale, globose scale, plum lecanium	Recorded on plants from nine genera in five families including apricot, plum, peach, Japanese apricot tree, Japanese plum, myrobalan plum, sweet cherry, ornamental cherry, almond, blackthorn	Flowers, fruit, stems, branches [264]	Infested plant material (branches and stems). Adults males are capable of flight over short distances[265]	Central and far-east Asia, Middle East, North America (USA), Europe (Mediterranean, southern and central parts)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Tessaratoma papillosa	Lychee stink bug	Lychee, longan, citrus, plum, peach, pear, olive, banana	Fruit, flowers, stems	Infested plant material, soil and hitchhiking. Adults capable of flight.	Asia	LOW	MEDIUM	LOW	LOW	**NEGLIGIBLE**
HYMENOPTERA (Ants and wasps)										
Hoplocampa cookei	Cherry fruit sawfly	Cherry, plum, prune	Flowers, fruits[266]	Adults capable of flight	North America	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[264] The scale can encrust the branches, stunting growth and drying of branches. Honeydew secretions and sooty mould are problems
[265] Females are wingless. First-instar nymphs (crawlers) are the most mobile stage in the life cycle, and disperse both actively and passively via wind, flying insects, birds
[266] Larvae bores into young fruit which quickly hollows out, larvae can move across into a number of fruits, fruit yellows and drops prematurely

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
LEPIDOPTERA (Butterflies and moths)										
Acleris fimbriana	Yellow tortrix	Peach, apricot, almond, cherry, apple, blackthorn, billberry, bog whortleberry, cranberry, *Betula nana* (dwarf birch).	Leaves[267]	Infested plant material. Adults capable of flight.	France, Germany, Denmark, Italy, Slovakia, Hungary, Romania, Poland, Norway, Sweden, Finland, the Baltic region, Ukraine and Russia, China and South Korea	LOW	LOW	MEDIUM	UNKNOWN	**UNKNOWN**
Acrobasis tricolorella	Mineola moth, Destructive Prune Worm, Tricolored Acrobasis Moth	*Prunus* species, apricot, plum, cherries, apple, mountain ash, rose, and Christmas berry	Fruit, leaves, buds	Infested plant material. Adults capable of flight over short distances.	Canada, USA	LOW	LOW	MEDIUM	UNKNOWN	**UNKNOWN**

[267] Larvae feed within rolled leaves at apices of the branches of the host plant

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Acronicta psi	Grey dagger moth	Plum, *Prunus* species, apple, black cherry, roses, maple, elms and ash, *Rubus* spp., birch, alder, hazel, hawthorn, poplar, oak, willow, pear, rose and other ornamental Rosaceae[268]	Leaves	Infested plant material. Adults capable of flight.	Europe, Africa, Asia, Middle East	LOW	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**
Adoxophyes orana	Summer fruit tortrix, apple peel tortrix, smaller tea tortrix	Wide host range including, apricot, plum, peach, Japanese plum, apple, Asian pear (*P. pyrifolia*), Ussurian pear (*P. ussuriensis*), European pear (*P. communis*), quince, blackcurrant, raspberry, roses, blueberry, cherry, hazelnut, soybean, oak	Leaves, shoots, flowers and fruit [269]	Infested plant material (including fruit and leaves). Adults capable of flight over short distances [270]	Armenia, Azerbaijan, China, Georgia, Japan, South Korea, Europe	LOW	MEDIUM	HIGH	MEDIUM	**LOW**

[268] Prefers hazel trees. Considered more a forestry pest. Little evidence of significant damage on summerfruit
[269] *A. orana* spins a leaf against a fruit. The larva is often found in between those two plant organs and fruit damage is mostly found at the spots where leaf is attached to the fruit
[270] The flying activity is often restricted to the night, and migration is limited, especially for females. Larvae can be dispersed by wind

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Anarsia lineatella	Peach twig moth, Peach twig Borer	Almond, apricot, peach, damson, plums, pear, apple Japanese plum and *Prunus* spp.[271]	Leaves, stems, growing points, flowers, fruit	Infested plant material. Adults capable of flight.	Europe, Africa, Asia and USA	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
***Anomis mesogona* (syn. *Gonitis mesogona*)**	Hibiscus looper	Peach, *Rubus* spp., Citrus, Lantana, Rosa, Vitis[272]	Fruit	Infested plant material. Adults capable of flight.	South Korea, India, Somalia, Japan, Thailand	LOW	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**
Aporia crataegi	Black veined white	Hawthorn, quince, apple, apricot, cherry, plum, almond, peach, pear, oak, rowan, roses	Growing points, flowers, leaves[273]	Infested plant material (including stems/shoots/branches). Adults capable of flight.[274]	Asia, Africa, Europe	LOW	LOW	LOW[275]	LOW	**NEGLIGIBLE**
Archips argyrospilus	Fruit tree leafroller, apple leaf roller	Wide host range including, citrus, blueberry, oak, walnut, apple, apricot, cherry, common pear, raspberry, blackberry, grape	Leaves, buds, flowers, fruit	Infested plant material. Adults capable of flight.	Canada, USA	LOW	MEDIUM	MEDIUM	LOW[276]	**VERY LOW**

[271] *A. lineatella* is a serious pest of peach and apricot fruits. *Prunus* species, especially stone fruits, are the main hosts
[272] Prefers Rubus, Rosa and Lantana
[273] During outbreaks, whole branches and trees are defoliated
[274] *A. crataegi* is a strongly migratory species which can build up enormous numbers locally before exploding outwards in mass migrations.
[275] *A. crataegi* has not spread beyond its original migratory range
[276] Populations rarely heavy enough to cause a reduction in crops, but this pest can leave unsightly feeding scars on the fruit that causes fruit to be culled before packing.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Archips breviplicanus	Asiatic leafroller	Apple, European pear, citrus, G*lycine max*, peach, Japanese plum, Japanese cherry, Siberian crab apple (*M. baccata*), Chinese mulberry (*Morus australis*), Korean pear (*P. ussuriensis* var. *viridis*), soybean[277]	Leaves, fruit, shoots, flowers[278]	Infested plant material. Adults capable of flight.	Japan, China, Russia, South Korea	LOW	UNKNOWN	UNKNOWN	LOW-MEDIUM	**UNKNOWN**

[277] Mainly a pest of apples
[278] Leaf rolling species. Larvae attack young fruit

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Archips podana	Great brown twist moth, Fruit-tree tortrix	Wide host range including, apple, pear, cherry, plum, blackcurrant, blackberry, raspberry, quince, Japanese plum, European alder, hazelnut, oaks (including *Q. robur* and *Q. ilex*), European honeysuckle, Japanese spindletree, blueberry, clover, beech, currant, spruce, rugosa rose	Leaves, inflorescence, fruits, buds	Infested plant material. Adults capable of flight.	Georgia, Kazakhstan, South Korea, Canada, Europe	LOW	MEDIUM	MEDIUM	MEDIUM	**VERY LOW**
Archips rosana (syn. *Archips rosanus)*	European leaf roller, rose leaf folder, rose twist moth, rose tortrix, filbert leaf roller	Wide host range including, raspberry, blackberry, blackcurrant, blueberry, rose, apple, European pear, conifer and poplar, hazelnut, plum, apricot, peach, sweet cherry, Japanese plum, citrus, pine, common oak	Leaves, growing points, inflorescence, fruits	Infested plant material. Adults capable of flight.	Azerbaijan, Kazakhstan, Turkey, Canada, USA, Europe	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Archips xylosteanus (syn. *Archips xylosteana*)	Variegated golden tortrix, apple leafroller, brown oak tortrix, forked red barred twist moth	Pot marigold, fennel, apple, apricot, peach, sweet cherry, dog rose, evergreen oak, common oak, nightshade, citrus, raspberry	Leaves, flowers and fruit	Infested plant material. Adults capable of flight.	Azerbaijan, China, Bulgaria, Russia, Spain, Ukraine	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Argyrotaenia citrana (syn. *Argyrotaenia franciscana, Tortrix citrina*)	Orange tortrix, apple skinworm	Very wide host range including apple, European crab apple (*M. sylvestris*), strawberry, almond, peach, plum, cherry, apricot, *Rubus* spp., Pyracantha, citrus, willow, avocado, blueberry, grape, lupine, oak, walnut, asparagus,	Leaves, growing points, inflorescence, fruits, stems	Infested plant material. Adults capable of flight. Larvae can be dispersed by wind over short distances.	USA	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Argyrotaenia ljungiana	Grape tortrix	Grapevine, apple, pear, cedar, blueberry, citrus, apricot.	Fruit, leaves, shoots[279]	Infested plant material. Adults capable of flight.[280]	Europe, Asia (China, Japan)	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**

[279] Larvae skeletonize the leaves, with later instars roll or fold leaves, and feeding on buds and fruits.
[280] Pupation occurs in debris on the ground, in webbed leaves, or in bark crevices.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Argyrotaenia velutinana	Red banded leafroller	Alder, birch, lobelia, daisy, honeysuckle, blueberry, oak, geranium, hollyhock, fir, larch, spruce, pine, apple, plum, peach, cherry, rose, aspen, willow, elm, violet and grape	Fruit and leaves	Infested plant material. Adults capable of flight.	Canada, USA	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**
Calyptra lata (syn. *Oraesia lata*)	Fruit piercing moth	Apple, *Pyrus* spp., orange, plum, pear, peach, grape, apricot	Fruit[281]	Infested plant material. Adults capable of flight.	Asia, Russia	LOW	LOW	HIGH	MEDIUM	**VERY LOW**
Carposina sasakii (syn. *Carposina niponensis)*	Peach fruit moth, small peach fruit borer, peach fruit borer	Apple, European pear, Asian pear, ya pear (*P. bretschneideri*), peach, plum, apricot, quince, hawthorn, jujube (*Ziziphus jujuba*), almond, cherry	Fruit, seeds	Infested plant material. Adults capable of flight. Larvae pupate in the soil.[282]	North eastern China and Japan, South and North Korea, Russia	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Choreutis pariana	Apple-and-thorn skeletonizer	Apricot, peach, sweet cherry, apple, European pear, hawthorns, loquat.	Leaves	Infested plant material and machinery, adults capable of flight.	China, Japan, North America (USA), Europe (UK, Italy)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[281] Fruit piercing species
[282] Larvae can survive for long periods in stored fruits, so imported fruits are the most likely means of entry. The moths normally fly only short distances, although they have a potential to fly more than 10 km

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Choristoneura rosaceana	Oblique-banded leafroller, rosaceous leaf roller	Wide host range including apples, pears, peach, blueberries, sweet cherry, raspberry, stone fruit.[283]	Fruit, buds and leaves	Infested plant material, adults capable of flight.[284,285]	Canada, USA, Mexico	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**

[283] Preferred hosts appear to be woody plants and members of the family Rosaceae
[284] Larvae are external feeders, so are unlikely to spread with fruit. Potentially spread with nursery plants, however pathway is regulated.
[285] Young larvae may also disperse to other hosts by ballooning in the wind on a silk thread

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Clepsis persicana	White triangle tortrix, green needleworm	Coniferous trees, Boxelder, maple, sweet cicely, goldenrod, grey alder, green alder, mountain alder, alder, dwarf birch, paper birch, birch, hazelnut, bunchberry dogwood, blueberry, clustered green gentian, green gentian, currant, Canada mayflower, sweet fern, ash, balsam fir, white fir, subalpine fir, fir, western larch, larch, Engelmann spruce, white spruce, spruce, jack pine, Douglas-fir, paradise apple, peach, chokecherry, rose, blackberry, balsam poplar, black cottonwood, quaking aspen, cottonwood, willow, elm	Leaves, fruit	Infested plant material, adults capable of flight.	USA, Canada	LOW	MEDIUM[1]	UNKNOWN	UNKNOWN	**UNKNOWN**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Cnephasia jactatana[286]	Black-lyre Leafroller	Kiwi, grape, raspberry, citrus, persimmon, apple, eucalyptus, Radiata pine, plum, New Zealand flax (*Phormium tenax*), hawthorn, vitus	Leaves, fruit	Infested plant material, adults capable of flight.[287]	New Zealand	LOW	MEDIUM	HIGH	MEDIUM	**LOW**
Cossus cossus	Goat moth, carpenter moth, timber moth	Wide host range including apple, cherry, citrus, olive, peach, pear, plum, quince, grapevine, walnut, alder, ash, birch, chestnut, elm, oak, poplar, willow, *Prunus* species.	Stems, leaves and roots[288]	Infested plant material. Adults capable of flight.	Europe, Asia and North Africa.	LOW	MEDIUM	LOW	LOW	**NEGLIGIBLE**

[286] Genus name uncertain
[287] Possibility of wind dispersal from New Zealand to Australia.
[288] Although *C. cossus* does attack healthy trees, it usually attacks trees weakened by age or other causes

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Ctenopseustis obliquana (syn. *Ctenopseustis herana*)	Brown headed leafroller	Chinese gooseberry, apple, blackberry, apricot, peach, raspberry, blueberries, grapevine, Radiata pine, eucalypt, oak, grape, avocado, macadamia, dock, clover, willow, kiwi, citrus [289]	Leaves, buds and fruit	Infested plant material. Adults are capable of flight [290]	New Zealand	LOW	HIGH	HIGH	MEDIUM	**LOW**
Cydia latiferreana	Filbertworm	Chestnuts, hazelnut (Corylus), beeches, almond, pomegranate, Quercus, stone fruit, apricot and peach	Fruit	Infested plant material and contaminated soil. Pupation occurs within the soil or leaf litter [291]	USA, Canada, Mexico	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Egira curialis (syn. *Xylomyges curialis)*	Citrus cutworm	Cherry, plum, citrus and oak [292]	leaves, flowers, and fruit	Infested plant material, soil and machinery. Adults capable of flight. Pupation occurs in the soil.	Canada, USA	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[289] Mainly a forest pest.
[290] Native to New Zealand and is considered to be a strong candidate for natural dispersal from New Zealand to Australia.
[291] Overwintering occurs in the soil or leaf litter.
[292] Major pest of hardwood forests. *Egira curialis* may also attack fruit and ornamental trees.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Erannis defoliaria	Mottled umber moth	Field maple, Sycamore, Common beech, Apple, sweet cherry, Japanese Plum, Rose, Oak including *Q. petraea, Q. robur, Q. rubra, Q. ilex,* plum, peach	Leaves	Infested soil and plant material. Males adults are capable of flight.	Europe	LOW	LOW	MEDIUM	LOW	**NEGLIGIBLE**
Eudocima tyrannus (syn*. Adris tyrannus, Ophideres tyrannus)*	Akebia leaf-like moth	Apple, pear, grape, peach, plum, citrus, fig, loquat, persimmon	Fruit [293]	Infested plant material. Adults capable of flight.	Nepal, Siberia, India, Pakistan, China, Philippines, and Japan.	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[293] *Eudocima tyrannus* is a fruit piercing moth, which causes damage to fruit while feeding

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Euproctis chrysorrhoea	Brown-tail moth	Apricot, plum, Japanese plum, sweet cherry, *Prunus* spp. apple, almond, European pear, grapevine, blackberry, raspberry, oak, hazelnut[294]	Leaves[295]	Infested plant material. Adults capable of flight[296]	Europe (widespread), North America (USA, Canada), Oceania (Papua New Guinea), Asia (Iran, Syria, Afghanistan, Armenia, Azerbaijan, China, Israel, Japan, South Korea, Tajikistan, Turkey), Africa (Algeria, Mauritania, Morocco, Tunisia)	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**

[294] Major pest of hardwood forests
[295] Can completely defoliate trees, reducing growth and occasional causing tree mortality of tree
[296] Could be wind-blown from Papua New Guinea

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Euzophera semifuneralis	American plum borer	Wide host range including, Sweet cherry, sour cherry, plum, almond, persimmon, apple, poplar, pecan, elm, oak, olive, walnut, pomegranate, apricot, pear	Trunk, branches (cambium feeder)	Infested plant material. Adults capable of flight. Could potentially enter in nursery stock[297]	North and Central America, Middle East	LOW	MEDIUM	LOW-MEDIUM	LOW	**NEGLIGIBLE - VERY LOW**
Grapholita funebrana (syn. *Cydia funebrana*)	Plum fruit moth, red plum maggot	Sour cherry, apricot, sweet cherry, wild cherry, gean, plum, peach [298]	Fruit	Infested plant material. Adults are capable of flight.	Asia, Africa (Algeria), Europe	LOW	HIGH	HIGH	HIGH	**MEDIUM**
Grapholita packardi (syn. *Cydia packardi*)	Cherry fruitworm	Apple, sweet cherry, sour cherry, plum, peach, pear, hawthorn, blueberry, roses[299]	Growing points, shoots, fruit [300]	Infested plant material. Adults are capable of flight over short distances.	Canada, USA	LOW	HIGH	HIGH	HIGH	**MEDIUM**
Grapholita prunivora (syn. *Cydia prunivora*)	Lesser appleworm, plum moth	Plum, apple, cherry, apricot, pear and peach, hawthorn, roses, elm	Fruit	Infested plant material, soil and hitchhiking. Adults are capable of flight. Pupae are soil borne	Canada, USA	LOW	HIGH	HIGH	HIGH	**MEDIUM**

[297] Wounds facilitate establishment of pest – higher infestation levels in mechanically harvested crops and heavily pruned trees
[298] Commonly a pest on plums. Records of damage to cherry, sour cherry and apricot are not uncommon. Presence on peach is uncommon
[299] Primarily a pest of cherry
[300] Larvae feed inside shoots or fruit

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Hedya nubiferana	Bud moth, Green budworm, marble orchard tortrix	Apple, European pear, blackthorn, cherry, plum and apricot	Flowers, leaves, shoots	Infested plant material. Adults are capable of flight	Turkey, USA, Canada, Europe	LOW	HIGH	HIGH	LOW[301]	**VERY LOW**
Hedya pruniana	Plum bud moth, plum tortrix	*Prunus* species including blackthorn, plum, sweet cherry, apple, pear, hazel	Leaves, shoots	Infested plant material. Adults are capable of flight	Europe	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Hyphantria cunea	Mulberry moth, American white moth, Fall web worm	Wide host range including maple, alder, ash, hickory, nut trees (including pecan, walnut and hazel), Rosaceae species (including apple, plum, pear and cherry), persimmon, poplar, willow, sycamore and mulberry, grape	Leaves	Infested plant material. Adults are capable of flight	Asia, North America, Europe, New Zealand	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Lobesia botrana	Grape berry moth	Olive, cherry, plum, pomegranate, currants, grapevine, *Rubus* spp., privet	Fruit, inflorescence	Infested plant material. Adults capable of flight.	Asia, Africa, South America, Europe	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

[301] Although *H. nubiferana* is widely distributed in Europe and North America, it usually is not very abundant. It is only a minor pest of orchard fruits

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Lymantria dispar [302]	Asian gypsy moth	Wide host range including apple, European pear, Almond-leaved pear (*P. amygdaliformis*), European crab apple (*M. sylvestris*), chestnut, hazelnut, pecan, pistachio, walnut, *Prunus* spp., *Pinus* spp., maples, oaks, elms, box elder, birches, red gum, maize, *Rubus* spp., blueberry, spruce	Leaves, flowers[303]	Infested plant material, soil and machinery. Adults capable of flight [304, 305]	*L. d. asiatica* - Temperate Asia from the Ural Mountains east to China, Korea and the Russian Far East. *L. d. japonica* is found in Japan *L. d. dispar* is found in southern Europe, Northern Africa and North America.	HIGH	HIGH	HIGH	HIGH	**HIGH**

[302] There are three subspecies of *Lymantria dispar: L. d. dispar* (L.) (European gypsy moth*), L. d. asiatica* (Vnukovskij), and *L. d. japonica* (Motschulsky). Both*, L. d. asiatica* and *L. d. japonica* are considered to be Asian gypsy moths (AGM)

[303] In Eurasia where outbreaks are usually localized and of short duration, severe defoliation results in reduced growth but tree mortality is only occasionally observed. In North America, where outbreaks are much more frequent and of longer duration, two to three years of complete defoliation often results in significant tree mortality.

[304] Natural dispersal of European strains of gypsy moth is limited to short distance wind-borne movement of first instars. Note female *Lymantria dispar dispar* (the European strain) are winged but not capable of flight. However, females of the Asian strain are capable of flying distances over 1 km. Mostly spread between areas by trade.

[305] Egg masses can be laid on cars, trucks, trains or boats, on logs, or containers that are inadvertently moved by humans. The accidental introduction of *L. dispar* represents a risk in all temperate countries where it is not yet present

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Lymantria monacha	Nun moth	Birch, beech, spruce (*Picea* spp.), pines, oaks. Also affects apple and European pear, elms, apricot, raspberry, blueberry	Leaves[306]	Infested plant material. Adults capable of flight. Hitchhiking.[307]	Asia and Europe	LOW	LOW	LOW	UNKNOWN	**UNKNOWN**
Lymantria obfuscata (syn. *Lymantria obfuscata*)	Indian gypsy moth	Sour cherry, quince, walnut, stone-fruit, roses, cocoa, American plum, almond, oak, willow, popular, apricot	Leaves	Infested plant material. Adults are capable of flight.	Asia (India, Nepal, Afghanistan and Pakistan)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Malacosoma californicum	Western tent caterpillar	Oak, willow, poplar, birch, alder, hazelnut, ash, apple, almond, apricot, cherry, plum	Leaves	Infested plant material. Adults capable of flight.	Canada, USA	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Malacosoma neustria	Common lackey	Almond, apple, plum, pear, oak and hazelnut	Leaves	Infested plant material. Adults capable of flight.	Asia and Europe	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[306] Larvae defoliate host plants
[307] Can be spread on containers and ships as egg masses

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Malacosoma parallela	Mountain ring silk moth	Sweet cherry, Sour cherry, quince, walnut, apple, apricot, peach, pear, raspberry, almond,	Leaves [308]	Infested plant material. Adults capable of flight	Europe (Russia), Asia (Afghanistan, Armenia, China, Georgia, Syria, Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Operophtera brumata	Winter moth	Wide host range including *Prunus* spp. cherry, apple, pear, poplar, apricot, plum, peach, blueberry, raspberry, oak[309]	Fruits/pods, growing points, leaves	Infested plant material. Male adults are capable of flight[310]	Asia, Africa, USA, Canada, Europe	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Oraesia excavata	Fruit-piercing moth, Reddish oraesia	Apple, peach, grape, loquat, citrus, Korean pear (*Pyrus ussuriensis* var. *viridis*), pears, plums[311]	Fruit, leaves [312]	Infested plant material. Adults are capable of flight	Japan, China, South Korea, Taiwan, Thailand, Hawaii	LOW	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[308] Defoliation of host plants
[309] *O. brumata* larvae have been recorded on about 100 different host plants
[310] The female adult is almost wingless (having only stubs). Male moth has fully-developed wings and flies, but are weak fliers. Larvae crawl or are carried to the foliage by air currents
[311] Menispermaceous plants are preferred hosts for *O. excavata* oviposition, but caterpillars can feed on other plant families
[312] Fruit piercing moth - Adults pierce ripe fruit and feed on juice. Early instars leave the leaf epidermis intact, creating “windowpane” damage, while older caterpillars chew through the entire leaf

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Orgyia leucostigma	White-spotted tussock moth	Wide host range including apricot, peach, plum, American plum, Japanese plum, sweet cherry, sour cherry, apple, quince, European pear, pecan, walnut, roses, Azalea, currants, raspberry, blueberries. Main woody plants preferred include, fir, silk tree, eastern redbud, pine, Scarlet firethorn, oak, elm, willow.[313]	Leaves[314]	Infested plant material (including bark, stems/branches, wood). Male adults capable of flight. Young larvae are dispersed by wind.	North America (Canada, USA)[315]	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Orgyia thyellina	White-spotted tussock moth	Wide host range including apple, pear, (*Pyrus* spp.), cherry, oak, elm, willow, larch, plum, chestnut, walnut and mulberry [316]	Leaves	Infested plant material. Male adults are capable of flight	Japan, Korea, China and Taiwan[317]	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[313] Over 140 host species have been recorded
[314] Young larvae chew small holes which can progress to skeletonising leaves, whilst older larvae consume entire leaves. Severe infestations can lead to complete tree defoliation, with cocoons spun amongst branches and stems
[315] There are at least four distinct subspecies, with *O. l. plagiata* the most destructive (Canada)
[316] Favoured hosts are rose, apple and raspberry
[317] Native to eastern Asia, has been introduced to New Zealand, but since eradicated

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Ostrinia nubilalis	European maize borer, European corn borer	Wide host range including maize, sorghum, cotton, capsicum, apple, potato, peach, tomato[318]	Stem, shoots, leaves, fruit	Infested plant material. Adults are capable of flight	North America, Europe and North Africa	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Pandemis cerasana (syn. *P. ribeana*)	Common twist moth, currant tortrix, barred fruit-tree tortrix,	Wide host range including, quince, apple, peach, European pear, cherry, plum, nuts, blackcurrant, roses, raspberry, *Rubus* spp., *Ribes* spp., oaks, willow, blueberry[319]	Leaves flowers, fruits	Infested plant material. Adults are capable of flight	Canada, China, Europe	LOW	HIGH	HIGH	MEDIUM	**LOW**
Pandemis heparana	Fruit tree tortrix, apple brown tortrix, dark fruit-tree tortrix	Alder, birch, hazelnut, blueberry, chestnut, oak, walnut, ash, quince, strawberry, apple, apricot, cherry, peach, pear, rose, blackberry, elm[320]	Leaves, flowers, fruit	Infested plant material. Adults are capable of flight	China, Japan, Canada, Europe	LOW	HIGH	HIGH	MEDIUM	**LOW**

[318] Wide host range including horticultural and broad acre crops, through its favoured host is maize
[319] Apple and pear are the principal host plants of *P. cerasana*
[320] Although *P. heparana* occurs on both pome- and stone-fruits, it is mainly a pest of apple

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Pandemis pyrusana	Apple pandemis, pandemis leafroller	Alder, apple, apricot, cherry, and plum, birch, *Ceanothus* spp., dogwood, honeysuckle, European pear, *Ribes* spp., rose and willow	Buds, leaves, flowers and fruit [321]	Infested plant material. Adults are capable of flight	USA, Canada	LOW	HIGH	HIGH	MEDIUM	**LOW**
Phyllonorycter blancardella	Spotted tentiform leafminer	Plum, wild cherry, pecan, crab apple tree, apple, pear, quince.	Leaves[322]	Infested plant material. Adults are capable of flight	Europe, Asia (Iran, Israel, Turkey) and North America (Canada, USA)	LOW	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Phyllonorycter crataegella	Apple blotch leafminer	Plum, Japanese plum, sweet cherry, hawthorn, quince, *Malus* sp. (ornamental species), *Malus domestica*, crab-apple tree, European pear	Leaves, fruit[323]	Adults capable of flight	North America (Canada, USA)	LOW	LOW-MEDIUM	LOW-MEDIUM	LOW	**NEGLIGIBLE-VERY LOW**

[321] Overwintered larvae feed on blooms and on the surface of young fruit, causing them to drop or resulting in scarring and distortion. Summer generation larvae feed on leaf tissue and cause windowpaning

[322] Damage by *P. blancardella* is restricted to a reduction of photosynthesis in direct relation to the leaf surface area occupied by its mines. A few mines of *P. blancardella* can be tolerated, but heavier infestations might cause premature fruit drop and reduced fruit set the following year in some varieties

[323] Foliar damage can cause leaf abscission, premature fruit drop and reduced fruit yields

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Planotortrix excessana	Orchard leafroller, Green headed leafroller	Chinese gooseberry, apple, apricot, blueberries, cherry, peach, grape, strawberry, blackberry and eucalypts	Leaves and fruit	Infested plant material. Adults are capable of flight	New Zealand and Hawaii	MEDIUM	MEDIUM	MEDIUM	LOW-MEDIUM	**VERY LOW-LOW**
Planotortrix octo	Green headed leafroller	Wide host range including, peach, plum, cherry, apple, wattle, grapes, willow, alder, clover, poplar, gorse, broom, dock, broom, gorse, dock, and clover.	Leaves, fruit, shoots, stems[324]	Infested plant material. Adults are capable of flight.	Oceania (NZ)	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**
Platynota idaeusalis	Tufted apple bud moth	Apple, European pear, cherry, peach, plum	Fruit and leaves[325]	Infested plant and soil material. Adults capable of flight.	Canada and USA	VERY LOW	MEDIUM	MEDIUM	LOW	**NEGLIGIBLE**

[324] *Planotortrix octo* web together leaf edges or leaves and fruit to shelter within - they then feed on leaves or fruits. Feeding affects marketability of fruit
[325] Causes damage to fruit (feeding wounds/holes) and leaves. Leaf damage is not of economic concern, however fruit damage is.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Platynota stultana	Omnivorous leafroller	Very wide host range including apple, pears (*Pyrus* spp.), asparagus avocado, *Rubus* spp., carnation, celery, clover, sugar beet, maize, cotoneaster, cotton, *Ribes* spp., cyclamen, chrysanthemum, eucalyptus, ginkgo, grape, citrus, juniper, peach, peanut, capsicum, pine, rose, sorghum, soybean, tomato, walnut, yew, lucerne, pomegranate, prunes	Leaves, flowers, fruit[326]	Infested plant (fruit/leaves/flowers) material. Adults capable of flight.[327]	Mexico, USA	MEDIUM	HIGH	HIGH	LOW-MEDIUM	**LOW-MEDIUM**
Proeulia auraria	Chilean fruit tree leaf folder	Wide host range including, apple, apricot, plum, sweet cherry, peach, pear, grape	Flowers, fruits, leaves and shoots	Infested plant material. Adults capable of flight.	Chile	LOW	HIGH	HIGH	LOW	**VERY LOW**

[326] *P. stultana* chews shallow holes or grooves in the fruit surface, often near the stem end. Primary damage results from fruit feeding. Young fruit may be destroyed, and scars on older fruit will cause them to be culled or downgraded at harvest. Feeding injury may also increase the incidence of brown rot and other fruit decays

[327] Larvae may be blown by the wind to another plant

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Proeulia chrysopteris	Fruit leaf roller	Wide host range, maple, blueberry, English walnut, pine, apple, apricot, plum, peach, pear, citrus, grape	Flowers, fruits, leaves and shoots	Infested plant material. Adults capable of flight over short distances.[328]	Chile	LOW	HIGH	HIGH	LOW	**VERY LOW**
Recurvaria nanella	Lesser bud moth	Peach, apricot, plum, Japanese plum, sweet cherry, apple, European pear, almond, currant, gooseberry	Leaves, flower buds, flowers[329]	Adults capable of flight	Asia (Turkey), Europe (widespread), North America	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Saturnia pyri (syn. *Bombyx pyri)*	Giant emperor moth	Wide host range, hazelnut, walnut, *Prunus* spp. (including almond, apricot, cherry, plum), willow, maple, beech, Rubus, poplar, apple, olive, European pear	Leaves	Infested plant material. Adults capable of flight.	Africa (Algeria, Morocco), Europe, Asia[330]	LOW-MEDIUM	LOW-MEDIUM	MEDIUM	VERY LOW	**NEGLIGIBLE**

[328] Moves over short distances - 5 to 10 km at the most
[329] Larva mines leaf when young, and later feeds on the inside of the bud, during winter period larvae form dense webbing on branches
[330] *S. pyri* is a thermophilic species limited to the warmer areas of Europe, North Africa the Near East and the Mediterranean

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Schizura concinna	Redhumped caterpillar	Wide host range including walnut, almond, liquidambar, plum, apple, apricot, birch, cottonwood, cherry, pear, prune and willow	Leaves[331]	Infested plant material, soil and hitchhiking. Adults capable of flight. Pupation occurs on the ground (in the topsoil and organic debris).	USA	LOW	LOW-MEDIUM	MEDIUM	LOW	**NEGLIGIBLE - VERY LOW**
Spilonota ocellana	Eyespotted bud moth	Raspberry, blackberry, blueberry, plum, peach, dog rose, apple, pear, cherry	Leaves, growing points and fruit, flowers	Infested plant material, soil and hitchhiking. Adults capable of flight.	Turkey, Canada, USA, Europe.	LOW	MEDIUM[332]	MEDIUM	LOW	**VERY LOW**
Spulerina astaurota	Pear barkminer	European pear (*P. communis*), Asian pear (*P. pyrifolia*), apple, European crab apple (*M. sylvestris*), plum (*Prunus domestica*), flowering quince (*Chaenomeles* spp.)	Shoots, bark, stem	Infested plant material (including branches/timber), soil and hitchhiking. Adults capable of flight.	India, Japan, Korea and Russia	LOW	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**

[331] Heavy infestations can cause defoliation and fruit may drop prematurely as a result
[332] Suitable climate and hosts exist for the establishment of this pest in Australia.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Stathmopoda auriferella	Apple heliodinid	Apple, coffee, sunflower, grapes, citrus, mango, avocado, peach, pomegranate, prickly acacia (*Vachellia nilotica*), kiwi fruit, sorghum, coconut, coffee.	Fruit, leaves, flowers, flower buds	Infested plant material (fruit) and hitchhiking. Adults capable of flight[333]	Africa, Russia, South Korea, India, China, Japan, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Greece	MEDIUM	HIGH	HIGH	LOW	**LOW**
Synanthedon exitiosa	Peachtree borer	Prunus spp. including almond, peach, apricot, cherry, plum, nectarine, prune, etc.	Trunk, roots, stem[334]	Infested plant material, soil and hitchhiking. Adults capable of flight.	USA and Canada	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
Synanthedon pictipes	Lesser peach tree borer	Peach, plum, cherry, sour cherry, *Prunus pensylvanica*, damson, serviceberries, northern red oak, gean	Trunk, branches [335]	Infested plant material and hitchhiking. Adults capable of flight.	USA and Canada	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**

[333] Adult moths are winged and are good fliers.
[334] Young trees can be girdled. Older trees can be severely injured making them more susceptible to other insects/diseases
[335] Heavy infestations can kill individual limbs or an entire tree. *Synanthedon pictipes* usually enters tissue damaged by a canker or wound caused by mechanical or winter injury

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Thaumatotibia leucotreta (syn. *Cryptophlebia leucotreta*)	False codling moth, citrus codling moth, orange codling moth, orange moth	Wide host range including *Citrus* spp., pineapple, capsicum, cotton, lychee, mango, avocado, peach, maize, carambola, soursop, and guava, coffee, olive, tomato is a secondary host	Leaves, fruit, seed	Infested soil and plant material. Adults are capable of flight. Pupae are soil borne	Israel, Africa.	LOW	HIGH	HIGH	HIGH	**MEDIUM**
Thyas juno (syn. *Lagoptera juno*)	Fruit-piecing moth	Plum, peach, pears	Fruit[336]	Infested plant material. Adults capable of flight.	China, Japan, South Korea, Thailand, Borneo, Java, Indian Subregion	LOW[337]	LOW	LOW	MEDIUM	**VERY LOW**
Thyridopteryx ephemeraeformis	Evergreen bagworm	Wide host range including, peach, red maple, beech, pine, elm, cedar	Leaves[338]	Infested plant material (leaves and stems), male adults capable of flight, ballooning (wind dispersal) of larvae.[339]	India, USA	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[336] Fruit piercing moth that attacks ripe fruit
[337] Possibility of natural dispersal into northern Australia based on current distribution.
[338] Heavy infestations can lead to complete defoliation and plant death
[339] The adult females are wingless and legless, and thus cannot disperse eggs to new locations from the site of oviposition.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Xestia c-nigrum	Spotted cutworm	Wide host range including, maples, vegetables, apple, pea, sweet cherry, peach, pear, roses, raspberry, blueberry, grape[340]	Fruit, growing point, flowers, seeds, leaves, stems[341]	Infested plant material. Adults capable of flight.	Asia, Africa (Morocco), North America, El Salvador, Europe	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Yponomeuta padellus	Cherry ermine moth	sweet cherry, myrobalan plum, plum, almond, peach, Japanese plum, mountain ash	Shoots and leaves[342]	Infested plant material. Adults capable of flight[343]	China,Turkey, Canada, USA, Russia, France, Netherlands, UK	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Zeuzera pyrina	Wood leopard moth, leopard moth	Wide host range including, chestnut, maple, ash, holly, walnut, apple, poplars, pear, azalea, plum, grapes, elm, European olive, currant, beech, oak and willow, *Rubus* spp., almond, peach[344]	Stems, trunk, branches, bark,	Infested plant material, soil and machinery. Adults capable of flight. Eggs are soilborne[345]	Asia, Africa, USA, Canada, Europe	LOW	LOW	MEDIUM	LOW-MEDIUM	**NEGLIGIBLE -VERY LOW**

[340] 70 angiosperms, preferring primarily herbaceous dicotyledonous plants and low-growing shrubs, but occasionally feeding on fruit trees and grasses
[341] Usually most feeding activity is on foliage, so damage is in reduced yield rather than crop losses
[342] Heavy defoliation can cause economic losses to stonefruit and tree nursery industries
[343] Eggs laid in autumn on twigs and branches are shielded with sticky secretion that also protects 1st instar larvae over winter. Larvae feed gregariously in spring. Only 1 generation per year.
[344] Larvae are woodborers affecting a variety of trees and shrubs in over 150 plant species of up to 20 taxonomic genera
[345] Young caterpillars migrate passively on silk threads a large distance with the help of wind

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
THYSANOPTERA (Thrips)										
Frankliniella intonsa [346]	Flower Thrips, Taiwan flower thrips	Wide host range including, asparagus, capsicum, chrysanthemum, strawberry, soyabean, cotton, *Lilium* spp., rice, pea, peach, nectarine, rose, tomato, onion, bean	Fruit and inflorescence[347]	Infested plant material. Adults are capable of flight.	Asia, North America, Europe	MEDIUM	HIGH[348]	HIGH	MEDIUM	**MEDIUM**
Frankliniella tritici	Eastern flower thrips	Wide host range including apple, sweet cherry, sour cherry, plum, peach, strawberry, rose, soybean, oats, common bean, lucerne, asparagus[349]	Flowers, fruit[350]	Infested plant material. Adults are capable of flight.	Asia, North America (Canada, USA), Puerto Rico, Europe	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**

[346] Vector for Tospoviruses (Groundnut ringspot virus, Impatiens necrotic spot virus, Tomato chlorotic spot virus, Tomato spotted wilt virus)
[347] Flower thrips cause distortion of fruit, discolouration and reductions in quality
[348] Current reported distribution suggests that there are similar environments in parts of Australia that would be suitable for its establishment and spread.
[349] Reported as feeding on the flowers and leaves of apple, cherry, plum and peach. Plum and peach were more severely affected than the other tree crops
[350] Oviposition on fruit causes the formation of “pansy spots”, which are large (up to 12 mm) discoloured spots on the surface of the fruit. Likely to be managed using similar chemicals that are currently used to manage established thrips such as the Western flower thrips.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Haplothrips chinensis	Chinese Thrips	Wide variety of hosts including *Capsicum* sp. carrot, kiwi, chrysanthemum, cotton, *Lilium* spp., *Cupressus* spp., dandelion, *Lobelia* spp., *Lysimachia* spp., mandarin, orange, mango, onion, peach, plum, potato, pomegranate, rose (*Rosa chinensis*), hibiscus, gladiolus, tea, spinach, wheat	Leaves and flowers	Infested plant material and hitchhiking. Adults capable of flight [351]	China, Korea, Japan, Taiwan	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**
Taeniothrips inconsequens	Pear thrips	River maple, Malus, *Prunus* European pear, prune, sugar maple, plum, cherry, apple, pear, beech, amelanchier, black cherry	Leaves, stems, growing points, flowers, fruit[352]	Infested plant material, soil and hitchhiking. Adults capable of flight. Pupation occurs in the soil.	Europe, Asia, USA and Canada[353]	LOW	UNKNOWN	UNKNOWN	LOW	**UNKNOWN**

[351] This pest is listed as an invasive species by the USDA
[352] Pear thrips larvae fed on fruit causing russetting or scabbing of the surface, this resulted in deformed fruit
[353] *T. inconsequens* is an irregular and occasional, but sometimes serious, pest of deciduous fruit trees in Europe and Asia

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Thrips flavus	Honeysuckle thrips, European flower thrips	Wide host range including *Rubus* spp., pear, oats, *Brassica* spp., potato, daisy, pea, apricot, plum	Flowers, leaves	Infested soil and plant material and hitchhiking. Adults are capable of flight. Pupation occurs in the soil.	Europe and Asia	LOW	UNKNOWN	MEDIUM	LOW	**UNKNOWN**
Thrips major	Rubus thrips	Strawberry, nectarine, peach, roses, blackberry[354]	Flowers	Infested soil and plant material and hitchhiking. Adults are capable of flight. Pupation occurs in the soil.	Europe	LOW	HIGH	HIGH	LOW[355]	**VERY LOW**
Thrips obscuratus	New Zealand flower thrips	Nectarine, peach, cherry, apricot, apple, European pear, nashi pear, plum, peppers, asparagus	Flowers, fruit	Infested soil and plant material and hitchhiking. Adults are capable of flight. Pupation occurs in the soil.	New Zealand[356]	LOW[357]	MEDIUM	MEDIUM	MEDIUM-HIGH	**LOW-MEDIUM**

[354] *Thrips major* breeds on a range of flowering plants, and has been implicated in fruit loss in nectarine, peach and strawberries.
[355] *Thrips major* can cause extensive damage through feeding and ovipositioning, although it has not been found to vector Tospoviruses.
[356] Serious pest in New Zealand at harvest of stonefruit and kiwifruit
[357] Endemic to New Zealand. Possibility of natural dispersal, but risk considered to be low.

Pathogens and nematodes

Table 22. *Summerfruit pathogen and nematode threat summary table.*

This table includes pests of leviable summerfruit species; Prunus persica *(peach),* Prunus persica var. nucipersica *(nectarine),* Prunus domestica *(plum),* Prunus armeniaca *(apricot)*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
BACTERIA (including phytoplasmas)										
Argentinean Peach Yellows	Argentinean peach yellows	Peach	Leaves, stems[358]	Transmitted through infected plant material. Spread by unknown leafhopper vectors.	Argentina	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[358] Causes severe damage to individual trees

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Candidatus* Phytoplasma mali (with vector)**	Apple proliferation	*P. salicina* (Japanese plum) is a main host, other hosts include sweet cherry, apple, apricot, plum, European pear, grapevine	Leaves, stems, roots, fruit[359], [360]	Transmitted by infected plant material (including propagation material), root fusion, and grafting. Spread by psyllid vectors[361]	Asia (Syria, Turkey), Africa (Tunisia), Europe (widespread)	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
***Candidatus* Phytoplasma mali (without vector)**	Apple proliferation	*P. salicina* (Japanese plum) is a main host, other hosts include sweet cherry, apple, apricot, plum, European pear, grapevine	Leaves, stems, roots, fruit[359, 360]	Transmitted by infected plant material (including propagation material), root fusion, and grafting. Spread by psyllid vectors[361]	Asia (Syria, Turkey), Africa (Tunisia), Europe (widespread)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[359] Infected material can go unnoticed as it produces symptomless infections, however the Department of Agriculture has testing procedures in place reducing the risk of introducing this pest through legal pathways.

[360] Infected leaves roll downward and become brittle, chlorotic leaves are present, early defoliation may also occur. Infected trees lack vigour, trees show witches broom symptoms and may die or may recover in 2-3 years. Terminal buds show late growth and leaves form rosettes (which are often affected by powdery mildew (*Podosphaera leucotricha*)). Flowers are often later and fruit are usually small (sometimes only 25% of normal weight) with poor flavour. Root system can become impacted with reduce weight 20-40%

[361] The psyllids vectors *Cacopsylla costalis, C. mali*, *C. picta* and *C. melanoneura* and the putative the leafhopper vector, *Fiebierella floriii*, are all absent from Australia.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Candidatus* Phytoplasma phoenicium**	Almond witches' broom	Almond, peach, nectarine, citrus, chamomile, *Prunus scoparia, Smilax aspera,* and possibly other *Prunus* species	Whole plant[362]	Transmitted by infected plant material. Spread by unknown vector[363].	Lebanon, Iran, Asian and North Africa.	NEGLIGIBLE	NEGLIGIBLE	LOW	HIGH	**VERY LOW**
***Candidatus* Phytoplasma pruni (with vector)**	X disease, cherry buckskin, peach X disease, almond witches' broom, western X-phytoplasma	Switch sorrel (*Dodonaea viscosa*), apple, delphinium, peach, chokecherry, Japanese plum, almond, plum, sweet cherry, sour cherry[364]	Whole plant above ground (leaves, stems, flowers, fruits)[365]	Transmitted by infected plant material and mechanical grafting. Spread by vectors[366]	North America, UK	VERY LOW	MEDIUM	HIGH	HIGH	**LOW**
***Candidatus* Phytoplasma pruni (without vector)**	X disease, cherry buckskin, peach X disease, almond witches' broom, western X-phytoplasma	Switch sorrel (*Dodonaea viscosa*), apple, delphinium, peach, chokecherry, Japanese plum, almond, plum, sweet cherry, sour cherry[364]	Whole plant above ground (leaves, stems, flowers, fruits)[365]	Transmitted by infected plant material and mechanical grafting. Spread by leafhopper vectors[366]	North America, UK	VERY LOW	LOW	LOW	MEDIUM	**VERY LOW**

[362] Symptoms include early flowering, stunted growth, leaf rosetting, dieback, off-season growth, and shoot proliferation
[363] Likely vectored by leafhoppers
[364] Peaches and cherries are the main hosts. Is of minor importance on other hosts including almonds, apricots and plums.
[365] Initial symptoms include yellow spotting and rolling of the leaves, chlorotic leaves followed by leaf loss and eventually tree death
[366] Leafhopper vectors especially *Paraphlepsius irroratus*, *Scaphytopius acutus* and *Colladonas montanus*. To a lesser extent *C. geminatus*, *Fieberiella florii* and *Graphocephala confluens* - all absent from Australia. Dodders (*Cuscuta* spp.) also act as vectors and some species are present in Australia

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Candidatus* Phytoplasma prunorum**	European stone fruit yellows, apricot chlorotic leafroll phytoplasma	Sweet cherry, apricot, peach, plum, almond, Japanese plum, nectarine	Leaves, stem[367]	Transmitted by infected plant material and mechanical grafting. Spread by psyllid (*Cacopsylla pruni*) and leafhopper (*Asymmetrasca decedens)* vectors[368].	Europe, Asia (Azerbaijan, Turkey), Africa (Tunisia), Egypt	LOW	LOW	LOW	HIGH	**LOW**
Erwinia amylovora	Fire blight	Japanese plum (main host), apricot, myrobalan plum, plum, apple, pear, quince, loquat, strawberry, blackberry, raspberry, *Spiraea prunifolia*	Above ground (leaves, stems, flowers, fruits, branches)	Transmitted by infected plant material, wind, rain, insects or birds	Europe (widespread), North America (USA, Canda, Mexico, Bermuda) Asia (Armenia, Iran, Israel, Jordan, Kazakhstan, Korea, Republic of, Kyrgyzstan, Lebanon, Syria, Turkey) Africa (Algeria, Egypt, Morocco, Tunisia) Oceania (New Zealand).	HIGH	HIGH	HIGH	LOW-MEDIUM	**LOW-MEDIUM**

[367] Causes apricot chlorotic leaf roll of apricot, leptonecrosis of Japanese plum, and yellows and decline diseases of peach, European plum, almond and flowering cherry.
[368] Vectors are not present in Australia

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Peach rosette phytoplasma	Peach rosette disease, rosette of peach	Peach, plum, apricot, sweet cherry, sour cherry, Japanese plum, almond.	Whole plant, leaves, stems, roots, shoots, fruits, seed, stunting, dieback[369]	Transmitted *via* infected plant material, and grafting. Spread by an unknown insect vector.	North America (USA)	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**
Peach yellows phytoplasma	Peach yellows	Peach, almond, apricot, plum, Japanese plum, *P. cerasifera*[370]	Fruit, leaves, shoots, whole plant (death)[371]	Transmitted through infected plant material (including fruit and propagation material). Spread by the leafhopper vector *Macropsis trimaculata*	North America (Canada, USA)	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[369] Symptoms include multiple axillary buds and excessive numbers of shoots with shortened internodes is characteristic in diseased peach trees. Leaves develop in dense rosettes, with one or two abnormally long, straight leaves. Small number of mis-shapen fruit develop and drop prematurely. Severely infected trees die within 1st year of infection, affected plum trees can survive 2-3 years. Symptoms are similar to those caused by peach rosette mosaic nepovirus.

[370] Peach and nectarine are the principal hosts of peach yellows phytoplasma.

[371] Symptoms include, premature leaf bud development, chlorotic and dwarfed leaves, spindly branched shoots, shoot dieback. Poor quality fruit is produced. Tree death usually occurs within 2-3 years but survival for 6 years or longer is possible. Little peach strain produces slight different symptoms.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Phytoplasma pyri (syn. *Candidatus* Phytoplasma pyri*)*	Pear decline (PD)	Pear, hazel, quince, apple, peach, Japanese plum	Leaves, fruit, stems, whole plant (stunting)	Transmitted by infected plant material and mechanical grafting. Spread by psyllid vectors[372]	Asia (Azerbaijan, Iran, Lebanon, Turkey), Europe (widespread), South America (Chile), North America (Canada, USA) and Africa (Libya, Tunisia)	MEDIUM	LOW	LOW	MEDIUM	**VERY LOW**
Phytoplasma ziziphi (syn. *Candidatus* Phytoplasma ziziphi)	Sweet cherry virescence disease, Peach yellows, Jujube witches' broom (JWB)	Sweet cherry, sour cherry, peach, apricot, Cherry plum	Leaves, fruits[373]	Transmitted by infected plant material (including propagation material) and grafting.	China, Korea, Japan, Italy, India,	LOW	LOW	MEDIUM	HIGH	**LOW**
Pseudomonas amygdali	Bacterial canker of almond	Peach and almond	Branches and stems	Transmitted by infected plant material and infected pruning tools. Bacterial exudate from cankers is disseminated by rain or wind[374]	Afghanistan, Greece and Turkey	LOW	LOW	LOW	MEDIUM	**VERY LOW**

[372] *Cacopsylla pyricola*, *C. pyrisuga* and *C. pyri* are vectors and are all absent from Australia.
[373] Symptoms include chlorosis, upward leaf rolling and occasional red spotting of the leaves, fruit shrivelling and premature fruit drop, plant decline and death
[374] Cankers are the sole source of inoculum.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Pseudomonas syringae* pv. *persicae	Bacterial decline	Peach, nectarine, *Prunus salicina* (Japanese plum)	Shoots, branches, leaves, fruit, whole plant (wilting, dieback, plant death)[375]	Transmitted by infected plant material and infected pruning tools. Also spread by wind and rain[376]	France, New Zealand, Croatia	MEDIUM	HIGH	HIGH	MEDIUM	**MEDIUM**
Xylella fastidiosa[377,378]	Phony disease of peach, plum leaf scald, Pierce's disease of grapevines, citrus variegated chlorosis	Broad host range including peach, plum, apricot, cherry, sour cherry, coffee, lucerne, raspberry, grapevine, pear, almond, elm, sycamore, mulberry, oak, periwinkle, red maple, citrus and blueberry	Leaves, shoots, fruit, roots, whole plant (stunting)[379]	Transmitted by infected plant material. Spread by sap sucking insects[380]	Asia (Iran, Taiwan), North America (Canada, USA), South America (Argentina, Brazil, Paraguay, Venezuela), Central America, Europe (Italy) and Caribbean (Costa Rica, Puerto Rico)	HIGH	HIGH	HIGH	HIGH	**HIGH**

[375] In areas in which soil and weather factors favour the disease, bacterial decline can be severe, causing tree deaths and significant vegetative losses in branch development and hence crop production. Young trees (up to 5-6 years) are most susceptible. On nectarine fruit, lesions can lead to exudation of gum and the severe distortion of developing fruit.

[376] The main pathway for international spread is on infected planting material. Fruits without symptoms do not present a significant risk.

[377] At least six different subspecies of *X. fastidiosa* have been reported; *X. fastidiosa* subsp. *fastidiosa, X. fastidiosa* subsp. *multiplex*; *X. fastidiosa* subsp. *pauca*; *X. fastidiosa* subsp. *Sandyi*, *X. fastidiosa* subsp. *tashke; X. fastidiosa* subsp. *morus*

[378] *X. fastidiosa* subsp. *multiplex*, subsp. *pauca* and subsp. *fastidiosa* have been detected on plum; *X. fastidiosa* subsp. *multiplex* has been detected on apricot; *X. fastidiosa* subsp. *multiplex* and subsp. *fastidiosa* and subsp. *pauca* have been detected on peach.

[379] Symptoms on peach include, young shoots are stunted and bear greener, denser foliage (due to shorter internodes). Lateral branches grow horizontally or droop, so that the tree seems uniform, compact and rounded. Leaves and flowers appear early, and leaves remain on the tree longer than on healthy trees. Affected trees yield increasingly fewer and smaller fruits until, after 3-5 years, they become economically worthless.

[380] All sap sucking insects may have some potential to vector this pathogen, of most concern is the unknown ability of native Australian sap sucking insects to transmit *Xylella fastidiosa* strains. Important vectors overseas include: *Homalodisca vitripennis, Philaenus spumarius, Xyphon fulgida*, *Draeculacephala minerva* and *Graphocephala atropunctata*

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
FUNGI										
Apiognomonia erythrostoma	Cherry leaf scorch	Apricot, sweet cherry, sour cherry, *Prunus* species	Leaves, fruit, stems	Infected plant material. Dispersed locally by airborne ascospores by wind and rainsplash.	Asia, Europe, USA	LOW	LOW	LOW	MEDIUM	**VERY LOW**
Apiosporina morbosa (syn. *Dibotryon morbosum)*	Black knot	*Prunus* spp. including apricot, plum, peach, Japanese plum (*P. salicina*), black cherry (*P. serotina*), common chokecherrytree (*P. virginiana*), sweet cherry, sour cherry[381]	Stems, branches[382]	Infected plant material. Airborne spores dispersed by wind and rain.	Canada, USA, Mexico, New Zealand, Japan	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

[381] Black knot has been reported on 24 *Prunus* species but most commonly found on wild and cultivated plums and cherries.
[382] Young, infected twigs may die during the first year of infection. Larger branches may take several years to display severe damage. The infected trees decline and become more symptomatic with each growing season. The infection stresses the entire tree making it weaken, decline, and possibly die. The stress placed on the tree may also make it susceptible to infections by other pathogens.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Armillaria tabescens	Armillaria root rot, Honey root rot	Very wide host range including *Prunus amygdalus*, Aleurites, citrus, oak, Acacia, Casuarina, hickories, Eucalyptus, lychee, oleander, pines, almond, peach, Japanese plum, common guava, Vitis, melaleuca, common jujube, banana, coffee, tea tree, apple, pear, macadamia, blueberry, apricot, plum	Roots, bark, stems, wood, whole plant (wilting/stunting)	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	China, India, Japan, South Korea, Malaysia, Nepal, Turkey, Madagascar, Malawi, Mauritius, Tanzania, Zimbabwe, Mexico, USA, Panama, Trinidad and Tobago, Brazil, Albania, Czech Republic, France, Germany, Greece, Italy, Montenegro, Netherlands, Portugal, Serbia, Slovakia, Slovenia, Spain, UK, Fiji	MEDIUM	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Aureobasidium prunicola (syn. *Gloesoporium prunicola, Microstroma prunicola*)	Fruit rot	Sweet cherry, sour cherry, *Prunus* spp. (*P. virginiana*, *P. persica*) plums, peaches, nectarines, apricots and almonds	Leaves, twigs, fruit[383]	Acomycete, conidia splash dispersed, and potentially wind dispersed. Dispersal is localised	Europe (Romania), North America.	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[383] Symptoms include leaf spots, twig blight, brown rot, mummy fruit

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Blumeriella jaapii	Cherry leaf spot, shot hole	*Prunus* spp. including sweet cherry, sour cherry, Japanese plum, apricot, plum, almond	Leaves	Transmitted by infected plant material. Transmitted by airborne and rainsplash dispersed spores.	Asia, Canada, USA, Europe, South Africa	LOW	MEDIUM	HIGH	LOW	**VERY LOW**
Coniochaeta prunicola		Peach, apricot, Japanese plum, cherry laurel	Twigs and leaves[384]	Transmitted through infected plant material, wind and splash dispersed spores.	South Africa, Slovakia, Europe	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Cristulariella pyramidalis (teleomorph *Grovesinia pyramidalis)*	Zonate leaf spot	Peach, grapes, *Rubus* species, soybean and avocado	Leaf	Transmitted by infected plant material	Asia, North America.	MEDIUM	HIGH	MEDIUM	LOW	**VERY LOW**
Cytospora oleina	Canker	Olive, apple, plum, cherry, peach and apricot	Stem	Transmitted by infected plant material	Greece, Italy, Pakistan, Cuba	MEDIUM	MEDIUM	LOW	LOW[385]	**NEGLIGIBLE**
Diaporthe decorticans (syn. *Diaporthe padi* var. *padi, Phomopsis padina*)	Cherry canker, twig blight of sour cherry	Peach, sweet cherry, sour cherry, almond, wild goose plum, hackberry (*Prunus padus*), Siebold's crabapple (*Prunus padus*), buckhorns (*Rhamnus frangula*), alder and cherry laurel	Stems, branches, bark	Transmitted by infected plant material	Europe (Poland, UK, Denmark, Austria, Germany, Sweden, Czech, Ukraine), North America (USA), Asia (Japan)	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

[384] Associated with wood necrosis
[385] Reports of severe damage but no tree deaths

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Helicobasidium mompa	Violet root rot	Wide host including apricot, peach, plum, mulberry tree, apple, sugar beet, soybean, potato, cotton, peanuts, tea, and grape.	Roots, whole plant (wilting/tree death)[386]	Transmitted by infected plant material, and contaminated soil.[387]	Japan, China and Korea, India, Taiwan, Malaysia, Uganda, Zimbabwe	LOW	LOW	LOW	MEDIUM	**VERY LOW**
Lambertella pruni	Fruit rot	Plum, cherry and apricot	Fruit, seedlings[388]	Transmitted by infected plant material	USA	LOW	LOW	UNKNOWN	UNKNOWN	**UNKNOWN**
Monilinia fructigena	Brown rot	Wide host range including, apple, pear, quince, stone fruit, apricot, plum, almond, peach, nectarine, Japanese plum, cherry, grapevine, azalea, roses, tomato, hazel nut, capsicum, blackberry, raspberry, strawberry, blueberry and fig	Fruit, blossoms, stems, leaves, branches and trunks	Transmitted through infected plant material, windborne, and rainsplash borne spores. Spread by bird and insect vectors.	Asia (Afghanistan, Armenia, Azerbaijan, China, Georgia, India, Iran, Israel, Japan, Kazakhstan, Korea, Lebanon, Nepal, Taiwan, Turkey, Uzbekistan) Africa (Egypt, Morocco), Europe (widespread)	MEDIUM	HIGH	HIGH	MEDIUM[389]	**MEDIUM**

[386] Causes decline and death of infected trees
[387] Fungus is soilborne and can survive for several years as sclerotia and mycelial strands
[388] Post-harvest fruit rot in the USA
[389] Occasionally causes economic losses in plum especially in hot and humid summers

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Monilinia mumecola	Brown rot	Peach, Japanese apricot	Fruit, blossoms, stems, leaf	Transmitted through infected plant material, windborne, and rainsplash borne spores	Japan, China	MEDIUM	LOW	MEDIUM	MEDIUM	**LOW**
Monilinia polystroma	Asiatic brown rot	*Prunus*, *Pyrus*, *Malus*, *Cydonia* species including plum, peach, nectarine, apricot, cherry, apple and pear	Fruit, blossoms, stems, leaves	Transmitted through infected plant material, windborne, and rainsplash borne spores	China, Japan, Europe (Czech Republic, Italy, Serbia, Croatia, Poland, Hungary, Switzerland, Slovenia)	HIGH	HIGH	HIGH	MEDIUM[390]	**MEDIUM**
Monilinia yunnanensis	Brown rot	Peach, *Crataegus pinnatifida, Malus* and *Pyrus* species	Fruit, blossoms, stems, leaf	Transmitted through infected plant material, windborne, and rainsplash borne spores	China	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**
Mycosphaerella pruni-persicae (syn. *Miuraea persicae*)	Peach leaf spot, Frosty mildew	Cherry, peach, apricot, *P. salicina*, *P. glandulosa*, *P. ulmifolia*, *Amygdalus ledebouriana* (wild almond)	Leaves	Transmitted by infected plant material, and airborne spores	Taiwan, China, Korea, Japan, Nepal. India, Azerbaijan, Armenia, Kazakhstan, Georgia, Kyrgyzstan, Russia, Bulgaria, Greece, Italy, USA, Canada	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

[390] *M. polystroma* is considered similar to *M. fructigena* with respect to pathogenicity.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Neonectria ditissima (syn. *Neonectria galligena*)	European canker, nectria canker, crotch canker, eye rot	Wide host rage affecting more than 60 species including apple, European pear (*Pyrus communis*), Asian pear (*Pyrus pyrifolia*), loquat, walnut, oak, maple, horse chestnut, alder, birch, hickory, dogwood, hazel, beech, ash, walnut, butternut, tulip tree, aspen, cherry, rose, willow, rowan tree, elm[391]	Whole plant, trunk, stem, fruit[392]	Transmitted through infected plant material (including bark, fruit, above ground plant parts, propagating material). Spores are dispersed by wind and rain.	Europe, North America (Canada, USA), Asia, Africa (Madagascar), South America (Argentina, Chile, Uruguay) and New Zealand, South Africa	MEDIUM	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Phyllosticta circumcissa	Phyllosticta leaf spot of apricot	Apricot	Leaves	Transmitted by infected plant material	Iraq, Canada	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Phymatotrichopsis omnivora	Cotton root rot, Texas root rot	Extremely wide host range including, apricot, plum, peach, almonds, citrus, soybean, cotton, walnut, apple, beans, almonds, pear, grape, ornamentals, Grevillea, Eucalyptus	Leaves, stem, roots whole plant (wilting)	Transmitted via infected plant material (roots and stems/trunk) and grown medium.	North America (Southwestern USA, Mexico), Libya and Venezuela, Korea, Dominican Republic, Malawi	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**

[391] *Prunus* is not a main host.
[392] Cankers form on branches and the trunk and can kill branch or the entire tree, depending on severity.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Podosphaera clandestina* var. *clandestina (exotic strains)	Powdery mildew	Sweet cherry, Japanese plum, plum, apricot, quince, hawthorn	Leaves, stems, fruit, shoots[393]	Transmitted by infected plant material (including fruit), wind and water splash dispersal of spores.	Asia (Armenia, Azerbaijan, China, Georgia, Iran, Iraq, Japan, Kazakhstan, Korea, Kyrgyzstan, Lebanon, Turkey, Turkmenistan, Uzbekistan), Africa (Libya, Mauritius, Morocco, Zimbabwe), North America (US), Europe (widespread), Oceania (NZ)	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**
Thekopsora areolata	Cherry spruce rust	Sweet cherry, sour cherry, plum, bird cherry (*Prunus padus*), black cherry (*Prunus serotina*), chokecherry (*Prunus virginiana*), spruce (main host)[394]	Flowers, leaves, seeds, shoots[395]	Transmitted via infected plant material (cones, seedlings, young trees), spores are dispersed by wind.	Europe (widespread), Asia (China, Mongolia, Pakistan, Japan), Central America (Dominican Republic), North America (Alaska)	HIGH	MEDIUM	MEDIUM	LOW	**VERY LOW**

[393] Mainly attacks leaves (fungus visible on surface), buds, and fruit. As infection develop, chlorosis, curling and necrosis occurs. Shoots can be stunted. Young fruit don't form properly with depressed or raised areas.
[394] *Prunus* species are secondary hosts
[395] Flowers become distorted, leaves develop abnormal colours, lack of seed production and shoot lesions and dieback

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
VIRUSES AND VIROIDS										
Apricot latent virus (ApLV) (Foveavirus)	Peach sooty ringspot virus	Apricot, peach, plum, Japanese plum, sweet cherry and *Prunus cerasifera* (cherry plum).	Leaves, fruit[396]	Transmitted via infected plant material and grafting	France, Turkey, Palestine, Lebanon, Egypt, Italy, Spain, Bulgaria and Moldova	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Apricot ring pox virus, Cherry twisted leaf virus	Cherry twisted leaf disease (CTLD), Apricot ring pox disease (ARPD)	Sweet cherry, apricot, Japanese plum, chokecherry	Leaves, fruit	Infected plant material, grafting, pruning.	USA	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
***Cherry mottle leaf (Trichovirus)* (with vector)**	Cherry mottle leaf virus (CMLV)	Sweet cherry, peach, apricot, almond, chinese wild peach, nanking cherry, mahaleb, Japanese plum, Myrobalan plum	Leaves, fruit, whole plant (stunting)[397]	Transmitted through infected plant material, budding and grafting. Spread by bud mite vector (*Eriophyes inaequalis*)	North America (USA, Canada), Asia (China), Europe (Italy, Poland), South Africa	LOW	LOW	HIGH	MEDIUM	**VERY LOW**
***Cherry mottle leaf* (*Trichovirus*) (without vector)**	Cherry mottle leaf virus (CMLV)	Sweet cherry, peach, apricot, plum, almond, chinese wild peach, nanking cherry, mahaleb, Japanese plum, Myrobalan plum	Leaves, fruit, whole plant (stunting)[397]	Transmitted through infected plant material, budding and grafting. Spread by bud mite vector (*Eriophyes inaequalis*)	North America (USA, Canada), Asia (China), Europe (Italy, Poland), South Africa	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[396] Chlorosis and leaf deformation in some apricot, peach and cherry cultivars. Can cause discoloured asteroid spots on peach fruit.
[397] Wide range of symptoms depending on host. In peaches a strain of *Cherry mottle leaf virus* has been associated with Peach Wart Disease symptoms, hard, wart-like outgrowths on the fruit surface. Symptoms on apricots include diffuse leaf mottling and low yield.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Cherry rasp leaf virus* (with vector)**	Cherry rasp leaf, flat apple virus	Peach, sweet cherry, sour cherry, apple, mahaleb cherry (*Prunus mahaleb*), European crabapple, raspberry[398]	Fruit, leaves, stems, whole plant (stunting)[399]	Transmitted through infected plant material (including seed) and grafting. Spread by nematode vectors (*Xiphinema americanum* and *X. rivesi*).[400]	North America (USA, Canada)	LOW	MEDIUM	LOW	LOW	**NEGLIGIBLE**
***Cherry rusty mottle-associated virus* (*Robigovirus*)**	Cherry rusty mottle disease (CRMD), American cherry rusty mottle disease	*Prunus* species including apricot, plum, peach, sweet cherry, sour cherry, mahaleb cherry (*P. mahaleb*), Japanese flowering cherry (*P. serrulata),* common choke cherry tree (*P. virginiana*), *P. lusitanica*	Leaves, fruit[401]	Transmitted by infected plant material (including plant propagation material), grafting, contaminated tools and machinery.	Canada, USA, New Zealand, South Africa, Europe	MEDIUM	LOW	LOW	LOW	**NEGLIGIBLE**

[398] The main hosts are cherries, peaches, and apples
[399] Causes serious stunting in peaches. Other symptoms include narrow leaves, leaf enations (leafy outgrowths or protuberances) on the under surface and cankering of tree trunks
[400] *Xiphinema americanum* and *X. rivesi* are present in Australia.
[401] Chlorotic mottling of basal leaves, early leaf fall, remaining leaves become bright yellow or red mottling

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Myrobalan latent ringspot* (*Nepovirus*)**	Myrobalan latent ringspot virus	Peach, sweet cherry, cherry plum (*Prunus cerasifera*)	Whole plant (stunting)[402]	Transmitted by mechanical inoculation, grafting. Possibly spread by unknown nematode vector[403]	Europe (France)	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Peach enation virus (Nepovirus)	Peach enation virus	Peach, *Catharanthus roseus*, *Chenopodium quinoa* (quinoa), petunia, radish	Whole plant (leaves, stunting)[404]	Transmitted through infected plant material, mechanical inoculation, transmitted by grafting	Japan	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Peach mosaic virus	American mosaic of peach	Peach, apricot, nectarine, plum, damson plum, almond	Fruit, leaves[405]	Transmitted through infected plant material, budding and grafting. Spread by peach bud mite *Eriophyes insidiousus*.	North America (USA and Mexico)	LOW	LOW	LOW[1]	LOW-MEDIUM	**NEGLIGIBLE - VERY LOW**

[402] Causes short internodes and rosetting in peach and enations on the leaves of sweet cherry
[403] Nematode transmission suspected but not established.
[404] Symptoms on peach include small enations on abaxial leaf surfaces, shortening of internodes
[405] Peaches and nectarines are the main economically affected hosts. Symptoms include, delayed leaf emergence, flowering and maturity and deformed fruit. Discolouration, necrosis and distortion of the leaves and stem pitting. Cultivated European and Japanese plums are highly susceptible, but express only leaf symptoms. Susceptible apricot cultivars symptoms include leaf discoloration and distortion, stubby twigs, less vigorous trees which produce less fruit.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Peach rosette mosaic virus* (*Nepovirus*)**	Peach rosette mosaic virus (PRMV)	Peach, fox grape, grapevine, blueberry, *Rumex crispus*, *Solanum carolinense*, *Taraxacum officinale*[406]	Whole plant (Leaves, flowers and stunting)	Infected plant material (including seed), vectored by nematode species.[407] Spread by infected pruning tools and machinery. Graft transmissible	Canada, USA, Turkey, Egypt	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
***Petunia asteroid mosaic* (*Tombusvirus*)**	Petunia asteroid mosaic virus	Plum, sweet cherry, spinach, grapevine, *Petunia* sp., privet, hops, dogwood	Fruit, shoots, leaves, whole plant (stunting)[408]	Transmitted by infected plant material (including plant propagation material), mechanical inoculation, grafting, present in soils.	Europe, Asia, North America	LOW	LOW	MEDIUM	MEDIUM	**VERY LOW**

[406] Infection of *Rumex crispus*, *Solanum carolinense*, *Taraxacum officinale* is asymptomatic.
[407] Suspected nematode vectors *Xiphinema americanum* (established in Australia) and *Longidorus diadecturus* (exotic to Australia).
[408] Host show yellow mottling and necrotic lesions on leaves, leaf and shoot distortion, stunting. Fruits develop sunken pits.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Plum pox virus* (*Potyvirus*)**	Sharka	*Prunus* sp. sour cherry, sweet cherry, plum, apricot, almond, peach, *P. besseyi* (bessey cherry), *P. cerasifera* (myrobalan plum), bitter cherry tree, dwarf cherry, mahaleb cherry, bird cherry, Canada plumtree, pin cherry, Japanese plum, (other natural hosts: clovers, dandelion, common privet, flowering almond, *P. japonica* (Japanese bushy cherry tree))	Leaves, stems, fruit, seeds[409]	Transmitted by infected plant material (plants may not show symptoms) and grafting. Spread by aphid vectors[410]	Asia (China, India, Iran, Israel, Japan, Korea, Pakistan, Syria, Turkey), Africa (Egypt, Tunisia), North America (Canada, US), South America (Argentina, Chile), Europe (widespread)	MEDIUM	HIGH	HIGH	EXTREME	**HIGH**
***Raspberry ringspot virus* (*Nepovirus*)**	Raspberry ringspot virus, raspberry Scottish leaf curl virus, red currant ringsport virus, European rasp leaf of cherry, ringspot of strawberry, ring spot of raspberry	Sweet cherry, currants, raspberry, strawberry, grapevine, cardinal-shrub, daffodil, common privet, plum	Fruit, leaves	Transmitted by infected plant material (including seed). Spread by nematode vectors (*Longidorus elongatus* and *Longidorus macrosoma*).	Asia (Iran, Kazakhstan, Turkey) and Europe (widespread)	LOW	LOW	LOW-MEDIUM	HIGH	**LOW**

[409] Symptoms appear on leaves and fruits. Leaves: chlorotic spots, bands or rings with vein clearing. Flower breaking and chlorotic spots/rings on fruits. Plum/apricot fruits are deformed, internal browning, rings/spots on stone.

[410] Vectored by *Aphis spiraecola* and *Myzus persicae* (both present in Australia). Other aphids shown to transmitted but at lower frequency: *Aphis craccivora, Aphis fabae, Brachycaudus cardui, Brachycaudus helychrysi, Brachycaudus persicae, Hyalopterus pruni, Myzus varians and Phorodon humuli, Aphis gossypii, Aphis hederae, Rhopalosiphum padi* and *Metopolophium dirhodum* (rose-grain aphid) and *Toxoptera citricida* (brown citrus aphid) (under experimental conditions).

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Strawberry latent ringspot (Sadwavirus),* (without vector)** (syn. *Aesculus line pattern virus, rhubarb virus 5, SLRSV*)	Latent ring spot virus of strawberry	Wide host range including, sweet cherry, strawberry, apricot, peach, plum, blackberry, raspberry, blackcurrant, red currant, rhubarb, celery, asparagus, roses, lily, daffodil, white clover, grapevine[411]	Leaves[412]	Transmitted by infected plant material (including propagating planting material and seeds), mechanical inoculation and grafting. Spread by nematode vector (*Xiphinema diversicaudatum*)[413]	Asia (India, Lebanon, Syria, Turkey), Africa (Egypt), North America (Canada, USA), Europe (Albania, Belarus, Belgium, Croatia, Czech Republic, France, Finland, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Serbia, Spain, Switzerland, UK, Yugoslavia), Oceania (New Zealand)	LOW	LOW	LOW[414]	LOW	**NEGLIGIBLE**

[411] Wide experimental host range 126 species, 27 families
[412] Symptoms depend upon host: leaves develop abnormal colouring, pattern and shape. Chlorotic mottling and yellowing and/or mosaic leaves, crinkling and distorted leaves. In peaches: SLRSV found associated with rosetting disease and mixed infections with prune dwarf virus resulted in decline of peaches in France.
[413] Vectored by *Xiphinema diversicaudatum* (absent in Australia)- both adult and larvae can retain virus for 84 days.
[414] Infected crops show a patchy distribution because of the slow lateral migration in soils of its nematode vector

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Strawberry latent ringspot* (*Sadwavirus*), (with vector)** (syn. *Aesculus line pattern virus, rhubarb virus 5, SLRSV*)	Latent ring spot virus of strawberry	Wide host range including sweet cherry, strawberry, apricot, peach, plum, blackberry, raspberry, blackcurrant, red currant, rhubarb, celery, asparagus, roses, lily, daffodil, white clover, grapevine[411]	Leaves[412]	Transmitted by infected plant material (including propagating planting material and seeds), mechanical inoculation and grafting. Spread by nematode vector (*Xiphinema diversicaudatum*)[413]	Asia (India, Lebanon, Syria, Turkey), Africa (Egypt), North America (Canada, USA), Europe (Albania, Belarus, Belgium, Croatia, Czech Republic, France, Finland, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Serbia, Spain, Switzerland, UK, Yugoslavia), Oceania (New Zealand)	LOW	MEDIUM	HIGH	LOW	**VERY LOW**
***Tobacco necrosis virus* (exotic strains)**	Tobacco necrosis viruses	Wide host range, including apple, European pear, apricot, plum	Roots	Transmitted by infected plant material and soil. Spread by fungal vector (*Olpidium brassicae* and *Olpidium virulentus*), which occur in Australia.	Widespread	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Tomato black ring virus* (*Nepovirus*)**	Ring spot of beet, black ring of tomato	Wide host range including, peach, *Rubus* species, beet, common bean, tomato, potato, onion, leek, almond.	Fruit, leaves, whole plant (dwarfing)	Transmitted by infected plant material (Seed and pollen transmissible), mechanical inoculation and grafting. Spread by nematode vectors (*Longidorus elongatus*, *L. attenuatus*[415, 416])	Europe (widespread), Asia (Japan, India, Turkey)	MEDIUM	MEDIUM	MEDIUM	MEDIUM[417]	**LOW**

[415] Both *Longidorus attenuatus* and *Longidorus elongatus* have been recorded in Australia, however may have been misidentifications (M. Hodda pers. Comm. July 2018). Additional studies are required to confirm presence in Australia.
[416] Nematode larvae and adults are able to transmit the virus however the virus is not retained after moulting, nor is it passed to progeny through the egg
[417] In some crop plant species, the virus induces severe decline in vigour causing significant losses in productivity both quantitatively and qualitatively

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
***Tomato bushy stunt virus* (*Tombusvirus*)**	Lycopersicon virus 4, Detrimental canker.	Wide host range including sweet cherry, plum, prunes, tomato, bell pepper, aubergine, apple, pear and tulip[418]	Leaves, stems, fruit	Transmitted by infected plant material (including seed and pollen), contaminated soil (virus is soilborne), mechanical inoculation and grafting.	Asia (Japan, Pakistan, Singapore), Africa (Morocco), North America (Canada, Mexico, USA), South America (Argentina, Suriname, Peru), Europe (Austria, Bosnia, Czech Republic, Italy, Germany, Greece, Ireland, Portugal, Spain, UK)	MEDIUM	MEDIUM	HIGH	LOW	**VERY LOW**

[418] Seed-borne in apple, pepper and tomato. Found in pollen and seed of sweet cherry.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Tomato ringspot virus (Nepovirus) (syn. *Peach yellow bud mosaic virus, Blackberry mosaic virus, Red currant mosaic virus*)	Tomato ringspot virus, Prunus stem pitting disease	Wide host range, including apricot, peach, plum, nectarine, cherry, almond, blueberry, blackberry, raspberry, gooseberry, apple, currants, grapevine, strawberry, pelargonium and various weed species.	Whole plant (stunting), leaves, buds, fruit, stem[419]	Transmitted by infected plant material (including seed and pollen[420]), grafting, sap transmission, root grafts. Spread by nematode vectors[421].	Asia (China, India, Iran, Japan, Korea, Oman, Pakistan, Taiwan), Africa (Egypt, Togo), North America (Canada, US, Mexico), South America (Brazil, Chile, Colombia, Peru, Puerto Rico, Venezuela), Europe (Belarus, Croatia, France, Italy, Lithuania, Poland, Russia, Serbia, Slovakia, Slovenia, Turkey), Oceania (Fiji, New Zealand)[422]	MEDIUM	HIGH	HIGH	MEDIUM-HIGH	**MEDIUM-HIGH**

[419] Tomato ringspot virus in *Prunus* spp. (peach, nectarine, sweet cherry, almond and plum) causes a range of fruit, bud, leaf and stem symptoms. Symptoms include leaf chlorosis and distortion, reduction in bud growth and fruit production

[420] Is seedborne in soybean, strawberry, raspberry, pelargonium and dandelion. Pollen transmission to seed has been demonstrated in pelargonium

[421] *Xiphinema americanum* (endemic) is a suspected vector, also vectored by *X. rivesi* (endemic) and *X. californicum* (exotic).

[422] Has previously been detected in Australia - is now presumed to be eradicated from Australia.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
OOMYCETE										
Phytophthora meadii	Rubber leaf drop, heart rot	Rubber (main host), peach, pineapple, eggplant, onion, areca nut, cardamom, Indian holly, cocoa, black pepper, black wattle, arum lily	Fruit, stems, roots[423]	Transmitted via infected plant material. Spores dispersed through rain splash and wind.	Asia, Oceania, South Africa, India, USA, South America, Italy, New Zealand	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**LOW**
Phytophthora tropicalis		Wide host range affecting plants in 32 families, including: carnation, periwinkle, papaya, rubber, rosemary, breadfruit, macadamia, apricot, eggplant, Leucospermum, cyclamen, verbena, camellia, rhododendron[424]	Leaves, stems, whole plant (wilting)		Taiwan, Vietnam, Mexico, USA, Brazil, Germany, Italy, Netherlands, Poland, Spain, French Polynesia, India	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**
NEMATODES										
Longidorus breviannulatus	Needle nematode	Maize, peaches, barley, tomato, potato, sorghum, citrus, grape	Roots	Transmitted by infested plant material, soil, and water.	USA	LOW	MEDIUM	LOW	MEDIUM	**VERY LOW**

[423] Caused peach fruit rot in Tawain
[424] *Prunus* not a main host

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Longidorus diadecturus **(ratings with *Peach rosette mosaic nepovirus*)**	Needle nematode	Peach, grape, cucumber, cherry, blueberry	Roots	Transmitted by infested soil, soil attached to plants and water.[425,426]	North America	LOW	MEDIUM	MEDIUM	MEDIUM-HIGH	**LOW-MEDIUM**
Longidorus diadecturus **(ratings without *Peach rosette mosaic nepovirus*)**	Needle nematode	Peach, grape, cucumber, cherry, blueberry	Roots	Transmitted by infested soil, soil attached to plants and water.[425,426]	North America	LOW	MEDIUM	MEDIUM	MEDIUM	**LOW**
Meloidogyne floridensis	Root knot nematode	Peach, capsicum, watermelon, eggplant and tomato	Roots	Transmitted by infested plant material, soil and water.	USA	LOW	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Paratylenchus prunii	Root lesion nematode	Peach	Roots	Transmitted by infested plant material, soil and water.	India	LOW	MEDIUM	HIGH	LOW	**VERY LOW**
Tylenchorhynchus acutus (syn. *Quinisulcius acutus*)	stylet-stunt nematode	Wide host range including nectarine, pear, apple, walnut, bean, soybean, mango	Roots	Transmitted by infested plant material, soil and water.	India, Pakistan, Turkey, Canada, USA, Cuba, Venezuela	MEDIUM	HIGH	MEDIUM	LOW - MEDIUM	**VERY LOW - LOW**
Xiphinema coxi **(ratings with viruses)**	Dagger nematode	Polyphagous including raspberry, strawberry, grapevine, stone fruit, alfalfa, citrus	Roots	Transmitted by infested plant material, soil and water.	North America (US), Europe (UK)	LOW	MEDIUM	LOW	MEDIUM	**VERY LOW**
Xiphinema coxi **(ratings without viruses)**	Dagger nematode	Wide host range including raspberry, strawberry, grapevine, stone fruit, alfalfa, citrus	Roots	Transmitted by infested plant material, soil and water.	North America (US), Europe (UK)	LOW	MEDIUM	LOW	LOW	**NEGLIGIBLE**

[425] *Longidorus diadecturus* is a vector for *Peach rosette mosaic virus*.
[426] Movement in soil is restricted to short (< 1 m) distances. Does not invade the roots so is spread mainly *via* infested growth media/soil or run off water.

Scientific name	Common name	Host(s)	Affected plant part	Means of movement and dispersal	Geographic distribution	Entry potential	Establishment potential	Spread potential	Economic impact	Overall risk
Xiphinema diversicaudatum	Dagger nematode	Wide host range including raspberry, blackberry, strawberry, beetroot, plum, peach, rose, onion, leek and grape	Roots	Transmitted by infested plant material, soil and water.	Asia, Africa, USA, Europe	HIGH	HIGH	LOW	LOW - MEDIUM	**VERY LOW - LOW**

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