

# Industry Biosecurity Plan for the Viticulture Industry

Version 2.0 August 2009

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Plant Health  
AUSTRALIA





|                            |  |
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- Australian Dried Fruits Association
- Australian Table Grape Association
- Wine Grape Growers' Australia
- Winemakers' Federation of Australia
- Scholefield Robinson Horticultural Services
- National Wine and Grape Industry Centre
- Foster's Group
- Office of the Chief Plant Protection Officer, Department of Agriculture, Forestry and Fisheries
- South Australian Research and Development Institute
- National Vine Health Steering Committee
- Primary Industries and Resources, South Australia
- Department of Primary Industries and Water, Tasmania
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- Queensland Primary Industries and Fisheries, part of the Department of Employment, Economic Development and Innovation
- Biosecurity Queensland, part of the Department of Employment, Economic Development and Innovation
- Victorian Department of Primary Industries
- Department of Regional Development, Primary Industry, Fisheries and Resources, Northern Territory
- New South Wales Department of Industry and Investment

## Endorsement

The *Industry Biosecurity Plan for the Viticulture Industry* (Version 2.0) was formally endorsed by the viticulture industry (through the National Vine Health Steering Committee), the Australian Government and all state and territory governments (through the Plant Health Committee) in August 2009.

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## List of acronyms

|         |   |
|---------|---|
| ADFA    | Australian Dried Fruit Association  |
| APVMA   | Australian Pesticides and Veterinary Medicines Authority                      |
| AQIS    | Australian Quarantine and Inspection Service                                  |
| AS/NZS  | Australian Standard/New Zealand Standard                                      |
| ATGA    | Australian Table Grape Association  |
| BSG     | Biosecurity Services Group  |
| CSIRO   | Commonwealth Scientific and Industrial Research Organisation                  |
| DAFF    | Department of Agriculture, Fisheries and Forestry                             |
| DAFWA   | Department of Agriculture and Food Western Australia                          |
| DEEDI   | Queensland Department of Employment, Economic Development and Innovation      |
| DPI     | Department of Primary Industries  |
| DPIW    | Department of Primary Industries and Water                                    |
| DQMAWG  | Domestic Quarantine and Market Access Working Group                           |
| DRDPIFR | Department of Regional Development, Primary Industry, Fisheries and Resources |
| EPPRD   | Emergency Plant Pest Response Deed  |
| GWRDC   | Grape and Wine Research and Development Corporation                           |
| IBG     | Industry Biosecurity Group  |
| IBMP    | Industry Best Management Practice   |
| IBP     | Industry Biosecurity Plan   |
| ICA     | Interstate Certification Assurance  |
| IPHRWG  | Interstate Plant Health Regulation Working Group                              |
| IPPC    | International Plant Protection Convention                                     |
| IRA     | Import Risk Assessment  |
| ISPM    | International Standards for Phytosanitary Measures                            |
| NAQS    | Northern Australia Quarantine Strategy  |
| NVHSC   | National Vine Health Steering Committee                                       |
| OCCPO   | Office of the Chief Plant Protection Officer                                  |
| PEZ     | Phylloxera Exclusion Zone   |
| PFF     | Papaya Fruit Fly  |
| PGIBSA  | Phylloxera and Grape Industry Board of South Australia                        |
| PHA     | Plant Health Australia  |
| PIRSA   | Primary Industries and Resources South Australia                              |
| PIZ     | Phylloxera Infested Zone  |

|       |  |
|-------|--|
| PRZ   | Phylloxera Risk Zone   |
| QA    | Quality Assurance  |
| QPIF  | Queensland Primary Industries and Fisheries, part of the Department of Employment, Economic Development and Innovation |
| SAVII | South Australian Vine Improvement Inc.   |
| SPS   | Sanitary and Phytosanitary   |
| TST   | Threat Summary Tables  |
| WFA   | Winemakers Federation of Australia   |
| WGGA  | Wine Grape Growers of Australia  |

**Note:** The definition of a pest as adopted by the International Plant Protection Convention (any species, strain or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products) is used throughout this plan.



# INTRODUCTION

# Introduction

## Plant Health Australia

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

The definition of a **pest** used in this document covers all insects, mites, snails, nematodes, pathogens (diseases) and weeds that are injurious to plants or plant products. **Exotic pests** are those not currently present in Australia. **Endemic pests** are established within Australia.

## Need for biosecurity plans

Australia's geographic isolation and lack of shared land borders have, in the past, provided a degree of natural protection from exotic threats. Australia's national quarantine system also helps to prevent the introduction of harmful exotic threats to plant industry. Rapid increases in overseas tourism, imports and exports, mail (Table 1) and changing transport procedures (e.g. refrigeration and containerisation of produce), as well as the potential for pests to enter via natural routes, mean that relying on these quarantine measures is not enough.

**Table 1.** Estimated number of imports and passenger arrivals into Australia each year

| Type of import                                  | Total number (million) |
|---|------------------------|
| Passenger arrivals <sup>1</sup>                 | 11.6                   |
| Freight consignments (air and sea) <sup>2</sup> | 6.3                    |
| Mail articles <sup>3</sup>                      | 162.8                  |

Eradication can be a costly exercise. The Papaya Fruit Fly (PFF) eradication campaign cost the Australian and state and territory governments around \$35 million over four years, excluding the cost to growers for control and lost markets. Industry estimates the cost of the campaign was approximately \$100 million in direct and indirect costs.

<sup>1</sup> Data sourced from Australian Bureau of Statistics, Overseas Arrivals and Departures, Australia 2008 ([www.abs.gov.au/ausstats/abs@.nsf/mf/3401.0](http://www.abs.gov.au/ausstats/abs@.nsf/mf/3401.0))

<sup>2</sup> Data sourced from Australian Customs Service Annual Report 2007-8 ([www.customs.gov.au/webdata/resources/files/annual\\_report.pdf](http://www.customs.gov.au/webdata/resources/files/annual_report.pdf))

<sup>3</sup> Data sourced from Australia Post Annual Report 2007-8 ([www.auspost.com.au/annualreport2008](http://www.auspost.com.au/annualreport2008))

Biosecurity planning provides a mechanism for the viticulture industry, government and other relevant stakeholders to actively identify potential pests of highest priority, analyse the risks they pose, and put in place procedures to reduce the chance of pests becoming established, and minimise the impact if a pest incursion occurs.

Ensuring the viticulture industry has the capacity to minimise the risks of 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, negotiate access to new overseas markets, and reduce the social and economic costs of pest incursions on both growers and the wider community.

## Background on the viticulture industry

The first grapevines were brought to Australia on board one of the ships of the first fleet in 1788 (Oag, 2001). The early years of grape growing were largely up to the government, but from 1800, private individuals and groups were responsible for the expanding grape growing industry. Planting and propagation of grapevines spread over the Australian continent with the increase in European settlement.

Today grapes are grown commercially in all states and territories and grape growing (wine, raisin and table) is now Australia's largest fruit industry (Oag, 2001). In 2007 there were approximately 164,000 hectares of vines being cultivated. Wine grape production is the most predominant of the three viticulture industries, producing over 1.8 million tonnes of grapes in 2008 (Table 2).

**Table 2.** Grape production summary 2008<sup>4</sup>

| Grape type             | 2008 production (t) | Change from 2007 |
|------------------------|---------------------|------------------|
| Winemaking             | 1,837,034           | 34%              |
| Drying                 | 56,139              | -31%             |
| Table and other grapes | 63,621              | -19%             |
| <b>Total</b>           | <b>1,956,794</b>    | <b>28%</b>       |

<sup>4</sup> Source: Australian Bureau of Statistics, Australian Wine and Grape Industry, 2008

## Wine grapes

In 2008, around 95% of wine grape production was carried out in South Australia (44%), Victoria (21%) and New South Wales (29%). Western Australia, Tasmania and Queensland have smaller wine industries, but they are growing rapidly in both volume and quality.

Wine grape production has steadily increased in Australia through to 2004. However, during the 2004-08 period, production levels plateaued, with the exception of a temporary drop in 2007 due to the effects of the drought. For 2008, there were 384 winery locations across Australia that produced more than 50 tonnes of grapes. Together, these wineries produced over 1.8 million tonnes grapes for winemaking (Table 3), which was over 90% of the total grape production in Australia.

While more than half the wine produced in Australia is exported (57%), mainly to Europe and North America, over \$2 billion worth of Australian wine was sold domestically in 2008 (Table 3).

**Table 3.** Wine and grape industry summary 2007-2008<sup>5</sup>

| Wine and grape industry                       | 2007-8    | Change from 2006-7 |
|---|-----------|--------------------|
| Area of bearing vines (ha)                    | 166,197   | 1.4%               |
| Total grape production (t)                    | 1,956,794 | 27.9%              |
| Fresh grapes crushed (t)                      | 1,831,523 | 31.1%              |
| Beverage wine production (million L)          | 1,257.4   | 28.5%              |
| Beverage wine inventories (million L)         | 1,872.4   | 5.0%               |
| Domestic sales of Australian wine (million L) | 426.4     | -4.8%              |
| Domestic sales value of Australian wine (\$m) | 2,096.2   | 4.6%               |
| Exports of Australian wine (million L)        | 714.7     | -9.2%              |
| Exports of Australian wine (\$m)              | 2,680.4   | -6.9%              |
| Imports of wine (million L)                   | 53.3      | 55.6%              |
| Imports of wine (\$m)                         | 431.4     | 40.8%              |

## Table grapes

Green, red and blue/black varieties of table grapes are produced by 1100 growers in the major growing regions of Victoria (Sunraysia and the Murray Valley), south-eastern Queensland (Emerald, Mundubbera and St George), south-western Western Australia (Carnarvon and Swan Valley), central New South Wales, the Riverland in South Australia and central Northern

<sup>5</sup> Source: Australian Bureau of Statistics, Australian Wine and Grape Industry, 2008

Territory. The geographical spread of production enables fresh table grapes to be available from October through to May.

Since the first introduction of grapes, the Australian table grape industry has grown to more than 11,000 hectares producing about 50,000 tonnes annually. The industry is estimated to be worth \$330 million annually. Just over half of the grapes produced are consumed domestically and the remaining 45% exported to an increasing number of markets around the world. Export demand is increasing and with anticipated new market access into countries such as China, Korea and Japan it is expected exports will be greater than domestic sales in the future. Table grape imports come from the USA during the months of July to October with China requesting access for the same period. Chile has market access to Australia but has yet to import any fruit.

## Dried fruit

The Australian dried vine fruits industry is found predominantly in the Sunraysia region of Victoria and New South Wales.

Total production has dropped in recent years from around 30,000 dry tonnes in 2005 to less than 12,000 dry tonnes in 2008 due to the adverse impacts of low returns and low water allocations. Some recovery in production is expected in 2009, due to improved grower returns for dried vine fruits.

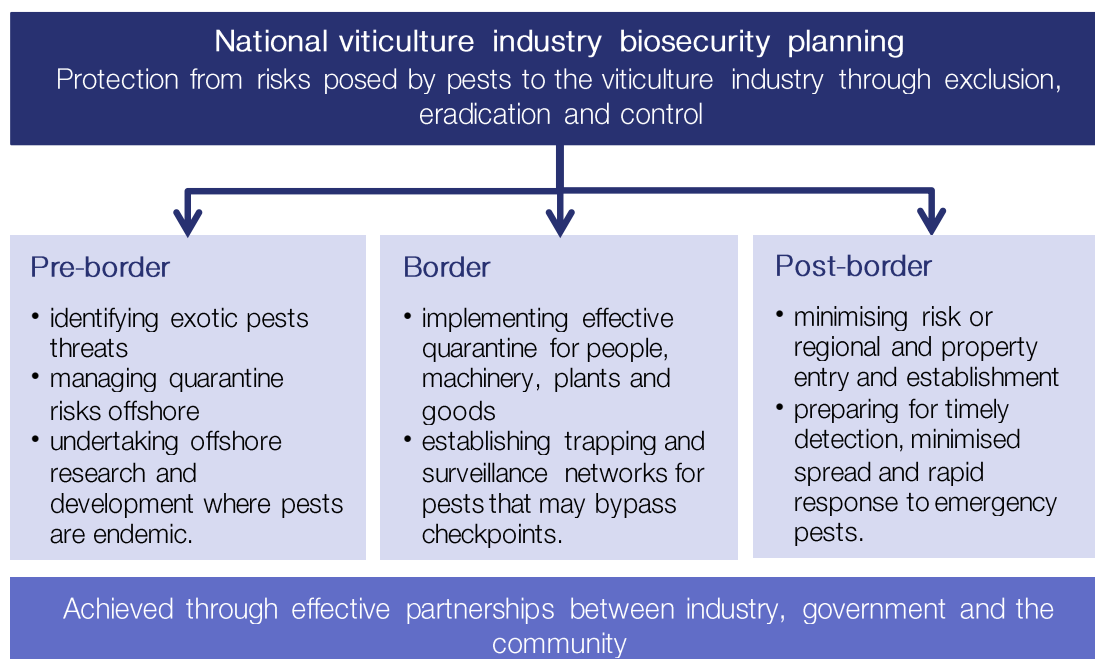
## What is industry biosecurity planning?

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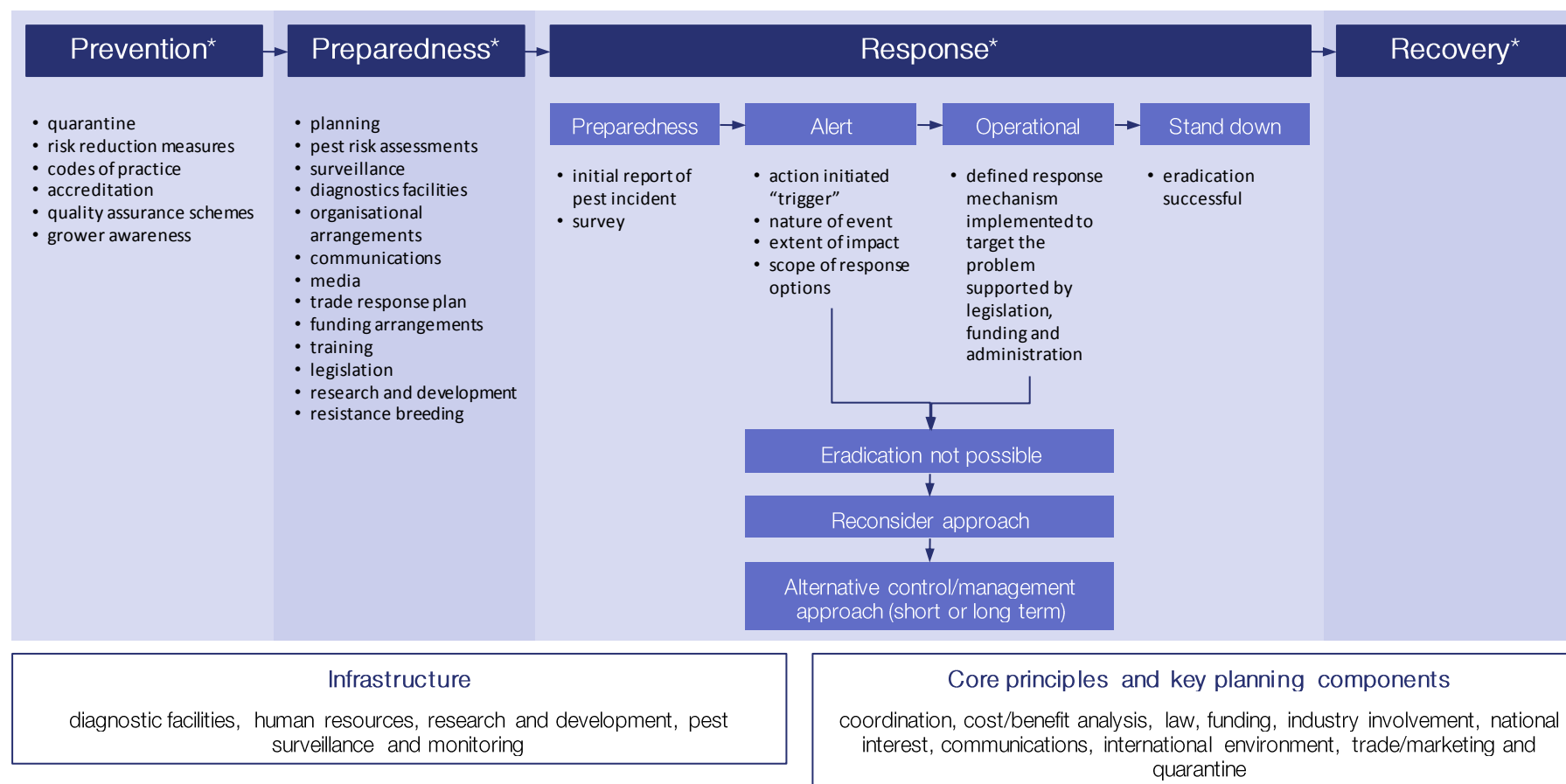
Industry biosecurity is the protection from risks posed by exotic organisms through actions such as exclusion, eradication, and control. Effective industry biosecurity relies on all stakeholders, including government agencies, industry, and the public (Figure 1). The components of the plant industry biosecurity continuum have been identified and described in PLANTPLAN. A summary of the incursion management plan from PLANTPLAN (2008) has been summarised in Figure 2.



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



**Figure 2.** Summary of incursion management for plant industries according to PLANTPLAN (2008)



Development of the *Industry Biosecurity Plan for the Viticulture Industry* (herein known as the Viticulture IBP) commenced in July 2001 and was funded by GWRDC and coordinated by Department of Agriculture, Western Australia. A subcommittee of the National Vine Health Steering Committee (NVHSC) was formed to progress the plan. The subcommittee includes representatives from viticulture industry associations from relevant states and territories, as well as representatives from state and territory agriculture agencies and the Australian Government. PHA took over development of the plan in 2003. Version 1 of the Viticulture IBP was launched in September 2006.

For the development of Version 2.0 of the Viticulture IBP, participants from viticulture industry associations and government agencies (Table 4) provided input into the review of the document. Complete review of the Threat Summary Tables (Appendix 1) was completed through consultation with experts.

**Table 4.** *Members of the Industry Biosecurity Group (Version 2)*

| Name              | Organisation   |
|-------------------|--|
| Phil Chidgzey*    | Australian Dried Fruit Association   |
| Jeff Scott        | Australian Table Grape Association   |
| Kevin Powell*     | Department of Primary Industries, Victoria   |
| Richard Hamilton* | Fosters Wine Group, South Australia  |
| Ron Hutton*       | National Wine & Grape Industry Centre  |
| Roberta Rossely*  | Office of the Chief Plant Protection Officer   |
| Stephen Dibley*   | Plant Health Australia   |
| Jo Slattery*      | Plant Health Australia   |
| Ian Pascoe        | Private Consultant   |
| Prue McMichael*   | Schofield Robinson Horticultural Services and Secretariat of the National Vine Health Steering Committee |
| Trevor Wicks*     | South Australian Research and Development Corporation  |
| Mark Sosnowski*   | South Australian Research and Development Corporation  |
| Paul Wright       | Vine Industry Nursery Association  |
| Mark Pullen*      | Vine Industry Nursery Association  |
| Mark McKenzie     | Wine Grape Growers Australia   |
| Tony Battaglione  | Winemakers' Federation of Australia  |

\* Attended the IBG meeting on the 21<sup>st</sup> November, 2008 in Adelaide

Key steps in the development of the Viticulture IBP included:

- identifying and documenting key threats to the viticulture industry
- developing an agreed plant pest threat priority list
- undertaking and documenting appropriate pest risk assessments
- developing an industry risk mitigation plan
- developing a generic incursion response plan
- developing pest-specific contingency plans for high priority pests
- agreeing on, and documenting the roles and responsibilities of stakeholder groups
- developing appropriate communication and consultation strategies
- developing a review strategy.

## Document overview

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The biosecurity package developed for the Australian viticulture industry focuses on a number of key areas.

### Threat identification, pest risk assessment, and incursion management funding arrangements

Guidelines are provided for the identification and categorisation of biosecurity threats through a process of qualitative risk assessment. The primary goal is to coordinate identification of emergency plant pest threats that could impact on productivity, sustainability, and marketability and to assess their potential impacts. This plan strengthens risk assessment work already being done both interstate and overseas. Risk assessments have been included for individual pests where available. Key viticulture biosecurity threats are detailed in Threat Summary Tables, along with the high priority plant pest threat list (the top ranked threats to the viticulture industry).

An Emergency Plant Pest Response Deed (EPPRD) has been negotiated between the government and industry members of PHA. The EPPRD came into effect on October 26, 2005 and as at August 2009, 27 plant industries, including the Winemakers' Federation of Australia, Australian Dried Fruit Association, Australian Table Grape Association and Wine Grape Growers' Australia, had formally ratified the EPPRD. The EPPRD is a formal legally binding agreement between Plant Health Australia (PHA), the Australian Government, all State and Territory Governments and plant industry signatories covering the management and funding of responses to Emergency Plant Pest (EPP) Incidents. The EPPRD is based on the following key principles of response to EPPs:

- cost minimisation for all parties
- early detection and response
- ensuring rapid responses to exotic pests - excluding weeds in the first instance
- ensuring decisions to eradicate are based on appropriate criteria (must be technically feasible and cost beneficial)
- an agreed list of potential emergency plant pests
- an industry commitment to biosecurity and risk mitigation and a government commitment to best management practice
- cost sharing/payment of eligible costs
- a cap on contributions (based on gross value of production)
- an effective industry/government decision-making process
- a limit in scope (to only cover exotic pest threats relevant to PHA member industries).

## Risk mitigation plan

This section provides a summary of activities to mitigate the impact of pest threats on the Australian viticulture industry, along with a set of guidelines for managing risk at all operational levels. Many pre-emptive practices can be adopted by plant industries and government agencies to reduce risks. These include:

- surveillance, awareness and training activities
- exclusion activities
- selection and preparation of appropriate planting materials
- destruction of crop residues
- control of vectors
- control of alternative hosts and weeds
- tillage practices
- produce transport procedures
- use of warning and information signs
- use of dedicated equipment when working in high risk areas
- restricting the use of high risk vehicles during high risk times



- reporting suspect pests to appropriate authorities
- including farm biosecurity in Industry Best Management Practice (IBMP) and Quality Assurance (QA) schemes.

## Contingency plans and response management procedures

PHA has developed PLANTPLAN, a generic emergency response plan for Australian plant industries. This plan details the procedures required and the organisations responsible in the event of an incursion of an exotic plant pest.

In time, the viticulture industry aims to develop pest-specific contingency plans for all identified high priority viticulture pests. These plans will enable government and industry to respond more effectively during an incursion.

This section also contains a listing of other pest-specific documents related to the viticulture industry. Relevant industry contact and communications information is also provided.

## Awareness material

This section provides details on where to find further information on key pest threats to the Australian viticulture industry. Sources of general biosecurity information related to the viticulture industry are also provided in this section.

## Review processes

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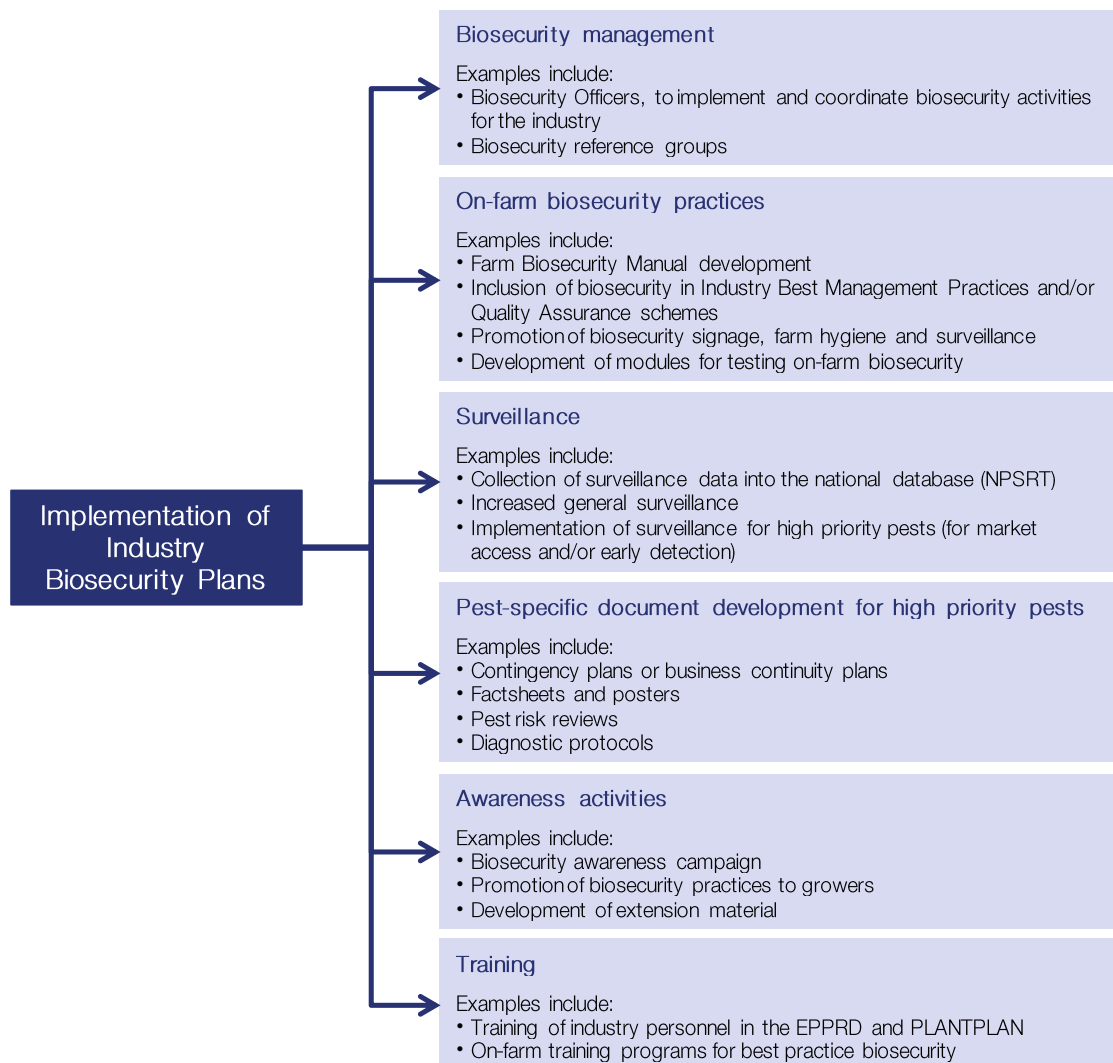
With the support of PHA, a sub-committee of the NVHSC is responsible for reviewing this plan on a 3-4 year basis. The review process will be used to determine:

- strategies to maximise the adoption of recommended practices
- where further improvements can be made
- revisions/updates to the plan
- where resources should be allocated to improve the plan
- strategies for the implementation of biosecurity measures.

# Biosecurity implementation

The development of the Viticulture IBP provides a framework for the implementation of biosecurity practices within the industry. Currently a range of biosecurity practices are undertaken within the viticulture industry and these are outlined in the Risk Mitigation chapter (page 36). Further implementation within the framework of the IBP, such as those practices outlined in Figure 3, should be investigated to increase preparedness in the industry.

**Figure 3.** Potential biosecurity implementation activities within the framework of the IBP



## References

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**THREAT  
IDENTIFICATION, PEST  
RISK REVIEWS, AND  
INCURSION  
MANAGEMENT  
FUNDING  
ARRANGEMENTS**

## Introduction – threat identification and incursion management

---

This section is designed to help identify high risk emergency plant pest threats to the viticulture industry, and to present a framework for assessing the potential economic, social, and environmental impacts associated with each threat. A consistent approach to threat identification and risk assessment will provide a strong base for future risk management activities by facilitating a more coordinated and efficient approach.

Emergency plant pests (EPPs) are defined as those that meet one or more of the following criteria:

- a) It is a **known exotic plant pest**, the economic consequences of an incident of which would be economically or otherwise harmful for Australia, and for which it is considered to be in the regional or national interest to be free of the plant pest
- b) It is a **variant form of an established plant pest** which can be distinguished by appropriate investigative and diagnostic methods, and which if established in Australia, would have a regional or national impact
- c) It is a **serious plant pest of unknown or uncertain origin** which may, on the evidence available at the time, be an entirely new plant pest, and which if established in Australia would have an adverse economic impact regionally and or nationally
- d) It is a plant pest of potential economic importance to the area endangered thereby and **not yet present** there or **widely distributed and being officially controlled**, but is occurring in such a fulminant outbreak form, that an emergency response is required to ensure that there is not either a large scale epidemic of regional or national significance or serious loss of market access.

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 emergency plant pest incursions, and assists in the response to emergency plant pest incursions, particularly those identified as key threats.

Identification of high risk 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.



## Threat identification

Information on biosecurity threats to the viticulture industry described in this document came from a combination of:

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

At this time, only invertebrate pests (insects, mites, molluscs and nematodes) and pathogens (disease causing organisms) have been identified, although the issue of weeds may be revisited through reviews of this plan.

## Ranking pest threats

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

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

The threat summary tables (TSTs) presented at Appendix 1 list potential plant pest threats to the viticulture industry and provide summarised information (where available) on entry, establishment and spread potential, and the consequences of establishment.

The most serious threats from the TSTs were identified through a process of qualitative risk assessment and are listed in the high priority plant pest threat list (Table 5).

Threats listed in the high priority plant pest threat list are exotic pests, not currently found in Australia. Specific contingency plans will be developed for these threats over time, and will be made available from PHA.

## Viticulture high priority plant pest list

Table 5 provides the top ranked threats to the viticulture industry (listed in alphabetical order according to scientific name). Additional pest specific information is provided in TSTs at Appendix 1. Assessments may change given more detailed research, and the priority list will be reviewed with the Biosecurity Plan on a 3-4 year basis.

**Table 5.** High priority plant pest list for viticulture

| Common name                              | Life form | Scientific name                         | Primary host                     | Plant part affected   | Entry potential    | Establishment potential | Spread potential   | Economic impact    | Total risk      |
|--|-----------|---|----------------------------------|---|--------------------|-------------------------|--------------------|--------------------|-----------------|
| <b>Grape phylloxera (exotic strains)</b> | Bug       | <i>Daktulosphaira vitifoliae</i>        | Grapevine                        | Roots, leaves   | <b>MEDIUM-HIGH</b> | <b>HIGH</b>             | <b>MEDIUM</b>      | <b>MEDIUM-HIGH</b> | <b>LOW-HIGH</b> |
| <b>Yellow vine mite</b>                  | Mite      | <i>Eotetranychus carpini</i>            | Chestnut, hazel, plum, grapevine | Fruit, leaves, shoots   | <b>MEDIUM</b>      | <b>MEDIUM</b>           | <b>MEDIUM-HIGH</b> | <b>HIGH</b>        | <b>MEDIUM</b>   |
| <b>Flavescence dorée</b>                 | Plo       | Grapevine flavescence dorée phytoplasma | Grapevine                        | Whole plant   | <b>MEDIUM</b>      | <b>MEDIUM</b>           | <b>UNKNOWN</b>     | <b>HIGH</b>        |                 |
| <b>Black rot</b>                         | Fun       | <i>Guignardia bidwellii</i>             | Grapevine                        | Stems, foliage, fruits  | <b>HIGH</b>        | <b>MEDIUM</b>           | <b>HIGH</b>        | <b>HIGH</b>        | <b>HIGH</b>     |
| <b>Glassy-winged sharpshooter</b>        | Bug       | <i>Homalodisca coagulata</i>            | Polyphagous                      | Seedling, vegetative (growing, flowering and fruiting stages) | <b>HIGH</b>        | <b>HIGH</b>             | <b>HIGH</b>        | <b>HIGH</b>        | <b>HIGH</b>     |

| Common name                  | Life form | Scientific name                      | Primary host                               | Plant part affected                    | Entry potential    | Establishment potential | Spread potential | Economic impact    | Total risk      |
|------------------------------|-----------|--------------------------------------|--|--|--------------------|-------------------------|------------------|--------------------|-----------------|
| <b>Grapevine leaf rust</b>   | Fun       | <i>Phakopsora euvitis</i>            | Grapevine                                  | Leaves                                 | <b>HIGH</b>        | <b>HIGH</b>             | <b>HIGH</b>      | <b>MEDIUM</b>      | <b>MEDIUM</b>   |
| <b>Vine mealybug</b>         | Bug       | <i>Planococcus ficus</i>             | Fig, mulberry tree, pomegranate, grapevine | Whole plant, including roots and fruit | <b>MEDIUM-HIGH</b> | <b>MEDIUM-HIGH</b>      | <b>MEDIUM</b>    | <b>MEDIUM-HIGH</b> | <b>LOW-HIGH</b> |
| <b>Omnivorous leafroller</b> | But       | <i>Platynota stultana</i>            | Polyphagous                                | Leaves, flowers, fruit                 | <b>HIGH</b>        | <b>HIGH</b>             | <b>HIGH</b>      | <b>MEDIUM</b>      | <b>MEDIUM</b>   |
| <b>Grape mealybug</b>        | Bug       | <i>Pseudococcus maritimus</i>        | Apple, peach, pear, grapevine              | Leaves, fruit                          | <b>MEDIUM-HIGH</b> | <b>MEDIUM-HIGH</b>      | <b>MEDIUM</b>    | <b>MEDIUM-HIGH</b> | <b>LOW-HIGH</b> |
| <b>Angular leaf scorch</b>   | Fun       | <i>Pseudopezizicola tetraspora</i>   | Grapevine                                  | Foliage                                | <b>MEDIUM</b>      | <b>MEDIUM</b>           | <b>HIGH</b>      | <b>HIGH</b>        | <b>MEDIUM</b>   |
| <b>Rotbrenner</b>            | Fun       | <i>Pseudopezizicola tracheiphila</i> | Grapevine                                  | Foliage                                | <b>MEDIUM</b>      | <b>MEDIUM</b>           | <b>HIGH</b>      | <b>HIGH</b>        | <b>MEDIUM</b>   |
| <b>Bacterial blight</b>      | Bac       | <i>Xanthomonas ampelina</i>          | Grapevine                                  | Systemic                               | <b>HIGH</b>        | <b>MEDIUM</b>           | <b>MEDIUM</b>    | <b>HIGH</b>        | <b>MEDIUM</b>   |
| <b>Pierce's disease</b>      | Bac       | <i>Xylella fastidiosa</i>            | Grapevine <sup>6</sup>                     | Systemic                               | <b>HIGH</b>        | <b>HIGH</b>             | <b>HIGH</b>      | <b>HIGH</b>        | <b>HIGH</b>     |

<sup>6</sup> Additional strains of *X. fastidiosa* infect a wide range of commercially important crops

## Description of terms used in pest risk tables

The descriptions below relate to terms in Table 5.

### Life form legend

|             |  |
|-------------|--|
| <b>Mite</b> | Mites (e.g. spider and gall mites) (ACARI)                               |
| <b>Bac</b>  | Bacteria   |
| <b>Fun</b>  | Fungus   |
| <b>Bug</b>  | Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers (HEMIPTERA) |
| <b>But</b>  | Butterflies and moths (LEPIDOPTERA)                                      |
| <b>Plo</b>  | Phytoplasma-like organism  |

### Entry potential

|                   |   |
|-------------------|---|
| <b>Negligible</b> | Probability of entry is extremely low given the combination of factors including the distribution of the pest source, management practices applied, low probability of pest survival in transit |
| <b>Low</b>        | Probability of entry is low, but clearly possible given the expected combination of factors described above   |
| <b>Medium</b>     | Pest entry is likely given the combination of factors described above   |
| <b>High</b>       | Pest entry is very likely or certain given the combination of factors described above   |
| <b>Unknown</b>    | Pest entry potential is unknown or very little of value is known  |

### Establishment potential

|                   |  |
|-------------------|--|
| <b>Negligible</b> | The pest has no potential to survive and become established  |
| <b>Low</b>        | The pest has the potential to survive and become established in approximately one third or less of the range of hosts. Could have a low probability of contact with susceptible hosts  |
| <b>Medium</b>     | The pest has the potential to survive and become established in between approximately one-third and two thirds of the range of hosts   |
| <b>High</b>       | 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 |
| <b>Unknown</b>    | The establishment potential of the pest is unknown or very little of value is known  |

## Spread potential

|                   |   |
|-------------------|---|
| <b>Negligible</b> | The pest has no potential for natural spread                                |
| <b>Low</b>        | The pest has potential for natural spread locally                           |
| <b>Medium</b>     | The pest has potential for natural spread throughout a physiographic region |
| <b>High</b>       | The pest has potential for natural spread to all production areas           |
| <b>Unknown</b>    | Spread potential is unknown or very little of value is known                |

## Economic impact

|                   |  |
|-------------------|--|
| <b>Negligible</b> | There is no impact on yield, host longevity, production costs or storage                       |
| <b>Low</b>        | There is minor impact on standing crop and little effect on stored product                     |
| <b>Medium</b>     | There is moderate impact on crops, but host mortality is rare, storage losses may occur        |
| <b>High</b>       | There is severe impact on standing crop, with significant host mortality and/or storage losses |
| <b>Extreme</b>    | There is extreme impact on standing crop, with extreme host mortality and/or storage losses    |
| <b>Unknown</b>    | The economic potential of the pest is unknown or very little of value is known                 |

## Pest risk reviews

The assessment of risk posed by exotic pests listed in IBPs is carried out using a pest risk assessment protocol based on that used by Biosecurity Australia (2009). A number of modifications have been made to suit the analysis required in the IBP development process. This assessment process was developed in accordance with the International Standards for Phytosanitary Measures (ISPMs) No. 2 and 11 (FAO, 2004; 2007).

A summary of the pest risk analysis protocol followed in this IBP is shown in Table 6, and the complete protocol used for pest risk analysis in this IBP can be found at [www.planthealthaustralia.com.au/go/phau/biosecurity/general-biosecurity-information](http://www.planthealthaustralia.com.au/go/phau/biosecurity/general-biosecurity-information).



**Table 6.** Summary of pest risk assessment process used in IBPs

|               |  |  |
|---------------|--|--|
| <b>Step 1</b> | Clearly identify the pest                          | <ul style="list-style-type: none"> <li>• Generally pest defined to species level</li> <li>• Alternatively a group (e.g. family, genus level) can be used</li> <li>• Sub-species level (e.g. race, pathovar, etc.) may be required</li> </ul>       |
| <b>Step 2</b> | Assess entry, establishment and spread likelihoods | <ul style="list-style-type: none"> <li>• Assessment based on current system and factors</li> <li>• Negligible, low, medium, high or unknown ratings</li> </ul>   |
| <b>Step 3</b> | Assess likely consequences                         | <ul style="list-style-type: none"> <li>• Primarily based on likely economic impact to industry based on current factors</li> <li>• Negligible, low, medium, high, extreme or unknown ratings</li> </ul>  |
| <b>Step 4</b> | Derive overall risk                                | <ul style="list-style-type: none"> <li>• Entry, establishment and spread likelihoods are combined to generate a likelihood score</li> <li>• Likelihood score combined with the likely economic impact to generate an overall risk score</li> </ul> |
| <b>Step 5</b> | Review the risk                                    | <ul style="list-style-type: none"> <li>• Risk ratings should be reviewed with the IBP</li> </ul>   |

The objective of risk analysis is to clearly identify and classify biosecurity risks and to provide data to assist in the evaluation and treatment of these risks. Risk analysis 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 analysis may be undertaken to various degrees of refinement, depending on the risk information and data available. Analysis may be qualitative, semi-quantitative, quantitative, or a combination of these. The complexity and cost of analyses 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 analysis, and if necessary, undertake more specific quantitative analysis later (AS/NZS-4360, 1999).

When a risk assessment is performed, it is important to document the type of analysis used, the level of confidence in the analysis, and any areas where assumptions have been made or where information is limited or unavailable. The steps listed below provide an outline of the qualitative pest risk assessment process.

Pest risk reviews for key threats to the viticulture industry are available for download from the Pest Information Document Database at [www.planthealthaustralia.com.au/pidd](http://www.planthealthaustralia.com.au/pidd). New pest risk reviews may be initiated at any time by government or viticulture industry stakeholders and submitted to PHA, as may be updated versions of existing pest risk reviews (when new information becomes available). After submission, the pest risk review will be circulated for

review by industry and government technical experts and upon acceptance will be available on the website.

The determination of entry potential in this document takes into account possible pathways for legal importation of apple and pear plant material as well as through contamination and the possibility of introduction through natural means such as wind. The scope is wider than the scope used by Biosecurity Services Group (formally Biosecurity Australia) in their Import Risk Assessments. The two approaches use similar underlying methodology, however due to the differences in the scope of consideration, risk outcomes may be different.

## Formal Categorisation of pests for inclusion in the Emergency Plant Pest Response Deed

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The following section outlines the EPPRD between all government and most industry members of PHA. The EPPRD aims to manage the impact of EPPs by establishing an industry/government agreement to cover eradication of emergency pests, reducing delays in securing funding, providing industry with greater involvement in eradication efforts, and removing disincentives to report emergency pests. The Australian viticulture industry is represented by the Winemakers' Federation of Australia (WFA), Wine Grape Growers of Australia (WGGA), Australian Table Grape Association (ATGA) and Australian Dried Fruit Association (ADFA). These associations represent the viticulture industry as members of Plant Health Australia and signatories to the EPPRD. These associations signed on the 2 May 2006 (WFA), 26 October 2006 (ADFA), 25 May 2007 (ATGA) and 29 May 2008 (WGGA).

The EPPRD only covers eradication responses to EPPs when based on an approved Emergency Plant Pest Response Plan. Weeds are not covered by the EPPRD at this stage. Under the EPPRD, both industry and government contribute to the total cost of the approved EPP Response, with the ratio of contribution based on the Category of the EPP (Table 7). The Category of the EPP is determined by the Categorisation Group and is based on the relative public versus private benefits of eradication of the EPP.

A copy of the EPPRD can be downloaded from the Plant Health Australia website ([www.planthealthaustralia.com.au](http://www.planthealthaustralia.com.au)).

## Pest Categorisation

The EPPRD outlines a mechanism whereby Industry and Government Parties will share the total cost of a Response to an EPP Incident based on agreed Categories. These Categories determine the ratio each party will pay, based on the relative public and private benefits of EPP eradication. Four Categories are included in the EPPRD, as outlined in Table 7 and Figure 4.

Pests listed in the high priority pest list (Table 5) may be put forward for categorisation and inclusion in Schedule 13 of the EPPRD. Other pests identified in TSTs or identified via other means as being priority pests, may also be categorised if required. The process for requesting categorisation of a Pest is set out in Schedule 3 of the EPPRD.

Pests that enter Australia, but which have not been formally categorised will be treated as belonging to Category 3 until an appropriate Category has been formally determined.

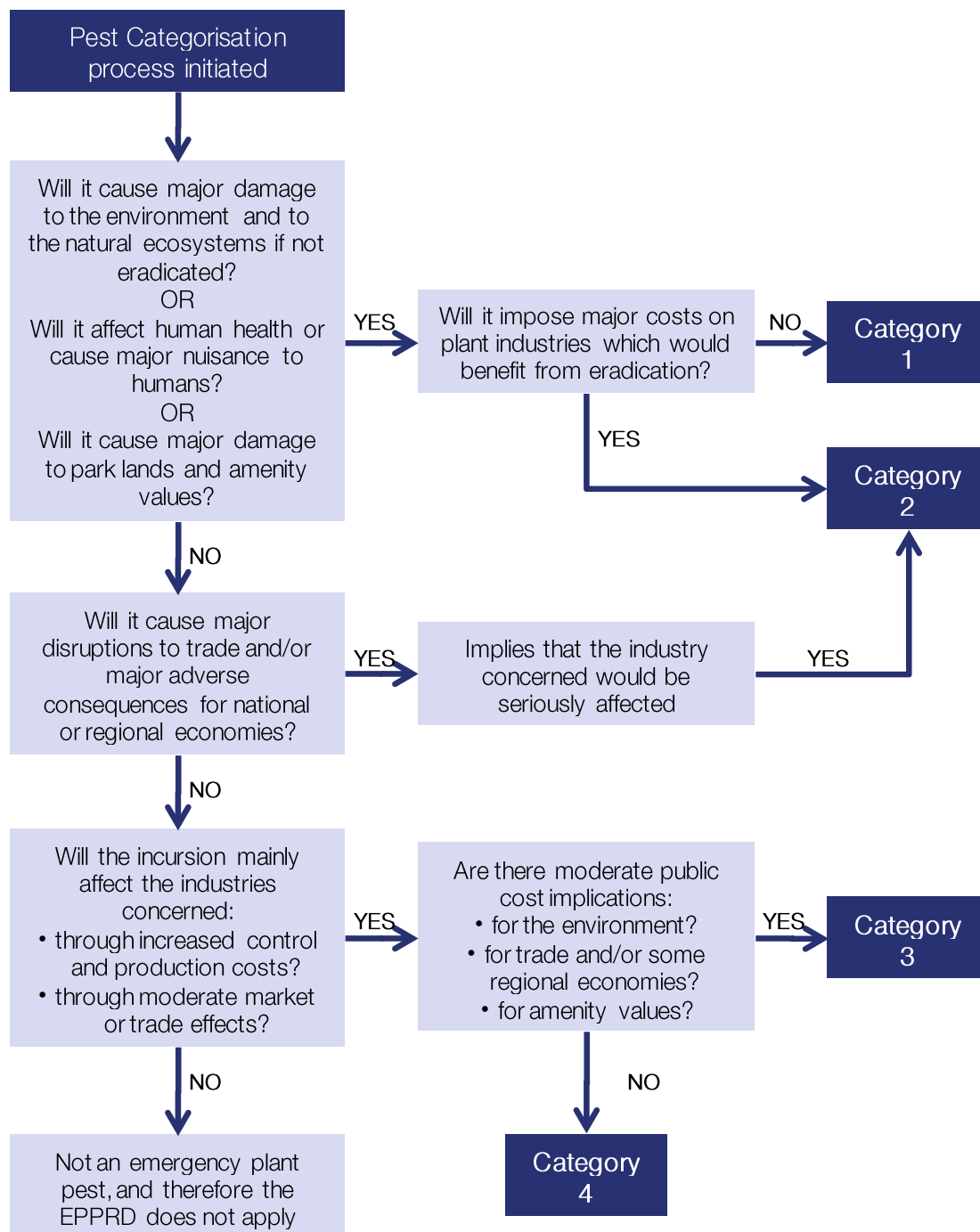
The Categorisation Group will be responsible for determining a cost sharing Category applicable for high priority pests. Only Pests meeting the EPP criteria will be considered for categorisation. Taking into account relevant scientific and other knowledge and experience, the Categorisation Group will consider requests for pest categorisation, re-categorisation or removal from Schedule 13 of the EPPRD. Figure 4 outlines the decision-making process used by the Categorisation Group in deciding pest Categories.

When more than one industry is affected by an EPP, the Categorisation Group will also determine and, when requested will review, the Funding Weight for each industry. Funding Weights provide a means for calculating each industry's Proportional Share of the total industry contribution if a pest affects multiple industry Parties.

EPPs for the viticulture industry that have received formal pest categorisation (included within Schedule 13 of the EPPRD) are listed in Table 8.

**Table 7. Cost sharing categories**

| Category  | Description   | Funding share                  |
|---|---|--------------------------------|
| <b>Category 1:</b><br>Very high public benefits             | Pest which if not eradicated would: <ul style="list-style-type: none"> <li>• cause major environmental damage to natural ecosystems; and/or</li> <li>• potentially affect human health or cause a major nuisance to humans; and/or</li> <li>• cause significant damage to amenity flora; and</li> <li>• have relatively little impact on commercial crops.</li> <li>• This category also covers situations where the pest has a very wide range of hosts including native flora and there is considerable uncertainty as to the relative impacts on the different crops. In short, it is almost impossible to properly determine which industries benefit from eradication and to what extent, and in any case, the incursion primarily affects native flora and/or amenity plants, and/or is a major nuisance if not a health risk to humans.</li> </ul> | 100% Government                |
| <b>Category 2:</b><br>High public benefits                  | Pest which if not eradicated would: <ul style="list-style-type: none"> <li>• cause significant public losses either directly through serious loss of amenity and/or environmental values and/or effects on households or indirectly through very severe economic impacts on regions and the national economy, through large trade losses with flow on effects through the economy; and</li> <li>• also impose major costs on the industries concerned so that these industries would significantly benefit from eradication.</li> </ul>   | 80% Government<br>20% Industry |
| <b>Category 3:</b><br>Moderate public benefits              | Pest which if not eradicated would: <ul style="list-style-type: none"> <li>• primarily harm the industries concerned but there would also be some significant public costs as well (that is, moderate public benefits from eradication). In this case the pest could adversely affect public amenities, households or the environment, and/or could have significant, though moderate trade implications and/or national and regional economic implications.</li> </ul>   | 50% Government<br>50% Industry |
| <b>Category 4:</b><br>Mostly if not wholly private benefits | Pest which if not eradicated would: <ul style="list-style-type: none"> <li>• have little or no public cost implications and little or no impacts on natural ecosystems. The affected commercial industries would be adversely affected primarily through additional costs of production, through extra control costs or nuisance costs; and</li> <li>• generally there would be no significant trade issues that would affect national and regional economies.</li> </ul>   | 20% Government<br>80% Industry |

**Figure 4. Summarised pest categorisation decision tree**

## Composition of the Categorisation Group

Membership of the Categorisation Group for each industry will comprise (at a minimum):

- an independent chair from Plant Health Australia
- a standing representative of industry parties
- three technical experts [people with specific expertise in the areas of plant pathology or entomology], one nominated by the Australian Government, one nominated by the states/territories and one nominated by plant industry(s)
- a person with relevant economic expertise including social, trade and regional impact assessment
- a nominee from each plant industry or industries affected by the exotic plant pest being categorised.

The Categorisation Group may also seek advice from:

- a person with human health expertise, if a public health risk may exist
- a conservation representative (e.g. Australian Government Department of Environment and Heritage) or
- other relevant members determined by the independent chair.

Advisers who have specific expertise may accompany members of the Categorisation Group, but will not be part of the decision-making process.

Categorisation Group composition taken from Part 4 of Schedule 8 of the EPPRD.

## Viticulture EPPs categorised to date

**Table 8.** Formal categories for pests of the viticulture industry as listed in EPPRD (as at December 2008)

| Common name                  | Scientific name                            | Formal Category |
|------------------------------|--|-----------------|
| Texas root rot               | <i>Phymatotrichum omnivorum</i>            | 2               |
| Pierce's disease             | <i>Xylella fastidiosa</i>                  | 2               |
| Grape phylloxera (biotype B) | <i>Daktulosphaira vitifoliae</i> biotype B | 3               |
| Black rot                    | <i>Guignardia bidwellii</i>                | 3               |
| Grapevine leaf rust          | <i>Phakopsora euvtis</i>                   | 3               |
| Grape root rot               | <i>Roesleria subterranea</i>               | 3               |

## References

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AS/NZS-4360 (1999) Risk Management Standards Association of Australia, Strathfield, NSW.

Biosecurity Australia (2009) Draft pest analysis report for '*Candidatus Liberibacter psyllaurosus*' in fresh fruit, potato tubers, nursery stock and its vector the tomato-potato psyllid. Biosecurity Australia, Canberra.

FAO (2004) Pest risk analysis for quarantine pests including analysis of 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 PLAN**



## Introduction – risk mitigation

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There are a number of strategies that can be adopted to help protect and minimise the risks of exotic and emergency pests under International Plant Protection Convention (IPPC) standards ([www.ippc.int/IPP/En/default.jsp](http://www.ippc.int/IPP/En/default.jsp)) and Commonwealth and State legislation.

Many pre-emptive practices can be adopted to reduce the risk of exotic pest movement for the viticulture industry. Such risk mitigation practices are the responsibility of governments, industry and the community.

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

Risk mitigation activities may include:

- barrier quarantine
- exclusion activities (e.g. restricting movement of planting material and machinery)
- surveillance, awareness and training (diagnostics, risk management, and incursion response procedures)
- selection and preparation of appropriate planting materials
- control of vectors
- control of alternative hosts and weeds
- destruction of crop and processing residues
- control of neglected vineyards/feral vines
- hygiene-conscious post harvest handling and produce transport procedures
- use of warning and information signs
- use of dedicated equipment when working in high risk areas
- restricting the movement of vehicles and equipment during high risk times
- including farm biosecurity in Industry Best Management Practice (IBMP) and Quality Assurance (QA) schemes
- research and development.

## Barrier quarantine

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Barrier quarantine should be implemented at all levels of the viticulture industry including national, state, regional, and vineyard levels.

### National level – importation restrictions

**Responsibility** > Australian Government

The Department of Agriculture, Fisheries and Forestry (DAFF) is the Australian Government department responsible for maintaining and improving international trade and market access opportunities for agriculture, fisheries, forestry, and food industries. DAFF 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.

DAFF also undertakes research to improve policies and procedures for protecting Australia's animal and plant health and natural environment, and provides technical assistance to further Australia's export market access program.

Biosecurity Services Group (BSG) is an agency of DAFF and is responsible for developing biosecurity (sanitary and phytosanitary) risk management policy and reviewing existing quarantine measures for the importation of live animals and plants, and animal and plant products. In particular, BSG undertakes Import Risk Analyses (IRAs) to determine which products may enter Australia, and under what quarantine conditions. BSG 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, BSG assists Australia's export market program by negotiating other countries' import requirements for Australian animals and plants.

The administrative authority for national quarantine is vested in the Australian Quarantine and Inspection Service (AQIS) under the *Quarantine Act 1908*. Quarantine policies are developed on the basis of an IRA process outlined in the report of the Australian Quarantine Review

Committee (Nairn *et al.*, 1996). AQIS Operations 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 AQIS Operations.

The *Quarantine Proclamation 1998* provides the legislative basis for controlling the entry of animals, plants, and other goods of a quarantine concern into Australia. Section 63 of the Proclamation provides that the importation of a seed (other than a seed of a kind of plant mentioned in Schedule 5 of the Proclamation) is prohibited unless the Director of Quarantine has granted a permit for its importation. Schedule 5 of the Proclamation lists all species that have been assessed as permitted seeds. The effect of this is to allow the importation of a seed species listed in Schedule 5 to Australia without an import permit.

The Schedule 5 “Permitted Seeds” list is maintained on the Import Conditions (ICON) database at [www.aqis.gov.au/icon](http://www.aqis.gov.au/icon). ICON 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.

The entry of any parts of *Vitis* plants or fruit from overseas is subject to an AQIS permit. AQIS also requires *Vitis* germplasm (planting material and tissue cultures) to be brought officially through post-entry quarantine. Further information is available on the ICON database. For export conditions see the PHYTO database at [www.aqis.gov.au/phyto](http://www.aqis.gov.au/phyto).

For advice on bringing any fruit or plant material into Australia, contact AQIS on (02) 6272 3933 or 1800 020 504.

## State and territory level – movement restrictions

### Responsibility > state and territory governments

Each state has quarantine legislation in place to control the importation of viticulture material and to manage agreed pests if an incursion occurs (refer to Table 9). 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 Domestic Quarantine and Market Access Working Group (DQMAWG).

Before moving grapes or viticulture material, machinery or equipment interstate, contact should be made with the appropriate authority (Table 9). Most state government departments

have a manual on quarantine entry requirements for plant material that can be accessed on the websites listed in Table 9. Additional information and current legislation can be found on the domestic quarantine website ([www.dqma.wg.org.au](http://www.dqma.wg.org.au)). Advice can be obtained by contacting your local state or territory agriculture agency directly.

For regular exporters an alternative mechanism is provided through the Interstate Certification Assurance (ICA) scheme. ICA is a national scheme of plant health certification based on quality management principles that offers cost saving and enhanced flexibility in certification. Under an ICA, a business can be accredited to issue Plant Health Certificates for movement of specified produce. For more information on specific ICA arrangements and their acceptance by jurisdictions visit [www.ica.gov.au](http://www.ica.gov.au).

**Table 9.** Interstate and interregional movement of grapes and viticulture materials – legislation and quarantine manuals

| State | Administering authority   | Legislation  | Links to quarantine manual <sup>7</sup>  |
|-------|---|--|--|
| ACT   | Environment ACT   | <i>Plant Disease Act 2002</i>  | See NSW conditions   |
| NSW   | NSW Department of Industry and Investment   | <i>Plant Diseases Act 1924</i>   | Phone 02 9735 9600<br><a href="http://www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases">www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases</a>   |
| NT    | Department of Regional Development, Primary Industry, Fisheries and Resources, NT     | <i>Plant Diseases Control Act 1979</i>   | <a href="http://www.nt.gov.au/d/Primary_Industry/index.cfm?header=NT%20Entry%20Requirements">www.nt.gov.au/d/Primary_Industry/index.cfm?header=NT%20Entry%20Requirements</a>   |
| QLD   | Biosecurity Queensland, Department of Employment, Economic Development and Innovation | <i>Plant Protection Act 1989</i><br><i>Plant Protection Regulation 2002</i>                                | <a href="http://www2.dpi.qld.gov.au/health/4058.html">www2.dpi.qld.gov.au/health/4058.html</a>   |
| SA    | Primary Industries and Resources, SA  | <i>Plant Health Act 2009</i>   | <a href="http://www.pir.sa.gov.au/planthealth/importers">www.pir.sa.gov.au/planthealth/importers</a>   |
| TAS   | Department of Primary Industries and Water, TAS                                       | <i>Plant Quarantine Act 1997</i>   | <a href="http://www.dpiw.tas.gov.au/inter.nsf/WebPages/SSKA-7FB94Z?open">www.dpiw.tas.gov.au/inter.nsf/WebPages/SSKA-7FB94Z?open</a>   |
| VIC   | Department of Primary Industries, VIC   | <i>Plant Health and Plant Products Act 1995</i><br><i>Plant Health and Plant Products Regulations 2006</i> | <a href="http://www.dpi.vic.gov.au/DPI/nrenfa.nsf/LinkView/9907FD43D194794DCA25718E001FE34C0F2B087FC279C31FCA257274001C054D">www.dpi.vic.gov.au/DPI/nrenfa.nsf/LinkView/9907FD43D194794DCA25718E001FE34C0F2B087FC279C31FCA257274001C054D</a> |
| WA    | Department of Agriculture and Food, WA  | <i>Plant Diseases Act 1914</i> and Regulations in 1989 <sup>8</sup>  | <a href="http://www.agric.wa.gov.au/quarantine">www.agric.wa.gov.au/quarantine</a>   |

<sup>7</sup> If the link does not work, the relevant documents can be found by going to the department home page and checking the quarantine section of each website<sup>8</sup> Due to be replaced by *Biosecurity and Agriculture Management Act 2007* in 2009

## Regional level – movement restrictions

**Responsibility** > state and territory governments

The quarantine legislation currently in place provides a basis for regulating the movement of grapes and viticulture plant materials between regions within states. Before moving grapes or viticulture material between some regions a permit must be obtained from the appropriate authority (see Table 9). Additional information and current legislation can be found on the domestic quarantine website ([www.dqmwg.org.au](http://www.dqmwg.org.au)). Advice can be obtained by contacting your local state or territory agriculture agency directly.

As grapevine phylloxera is subject to official management zones within Australia, the majority of information on regional and state level restrictions in the following sections is based on requirements for this pest.

### Grape phylloxera restrictions

Grape phylloxera is a major pest of the viticulture industry, and movement restrictions are placed on viticulture material in relation to phylloxera management zones. The phylloxera management zones are classifications of geographical regions according to whether they have been found to have phylloxera or not. There are three types of zones:

- phylloxera infested zone (PIZ)
- phylloxera exclusion zone (PEZ)
- phylloxera risk zone (PRZ).

The current list of recognised zones and location maps can be found at the National Vine Health Steering Committee (NVHSC) website ([www.gwrhc.com.au/nvhscphylloxera.htm](http://www.gwrhc.com.au/nvhscphylloxera.htm)).

A draft National Phylloxera Management Protocol has been developed by the National Phylloxera Technical Reference Group on behalf of the NVHSC<sup>9</sup>. This document outlines the industry standard in relation to the movement of grapes and grapevine material and vineyard equipment between phylloxera management zones.

### New South Wales

Phylloxera is a notifiable pest under Proclamation P172 of the New South Wales *Plant Diseases Act 1924*. Proclamation P176, gazetted 22 December 2006, prohibits the introduction into NSW of soil, grapevines (including cuttings and rootlings), whole wine grapes, must, unfiltered juice and pre-fermentation marc from phylloxera infested parts of NSW or other states. Grapevines and soil from interstate Phylloxera Risk Zones (PRZs) are also

<sup>9</sup> Available from [www.gwrhc.com.au/nvhscphylloxera.htm](http://www.gwrhc.com.au/nvhscphylloxera.htm)

prohibited. The movement of other grape and vine material, wine or associated machinery and equipment from interstate risk and exclusion zones is regulated by issuing a permit or plant health certificate. Packaged table grapes are permitted into NSW if free of soil and leaf material and, if from PRZ or Phylloxera Infested Zone (PIZ), treated with sulphur pads.

For current details the regulations and conditions of movement refer to the NSW Department of Industry and Investment website [www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases](http://www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases). For maps of the phylloxera management zones visit [www.phylloxera.com.au](http://www.phylloxera.com.au).

## Northern Territory

Administrative authority for regional quarantine in the Northern Territory is vested in the Department of Regional Development, Primary Industry, Fisheries and Resources (DRDPIFR) under the *Plant Diseases Control Act 1979*. A new Plant Health Act has been passed in the Legislative Assembly and assented to by the Northern Territory Administrator and is expected to commence in 2009. Plant import requirements and notifiable pests are gazetted under this Act. The Act enables quarantine areas to be declared and inspectors appointed to carry out wide ranging control and/or eradication measures. Grapevine plants, cuttings or budwood importations are prohibited unless approved in writing by the Chief Inspector and accompanied by acceptable certification that they are free of the pest phylloxera.

## Queensland

Administrative authority for regional quarantine in Queensland is vested in Biosecurity Queensland (BQ) under the *Plant Protection Act 1989*. Inspectors have been appointed under this Act and have gained experience with the viticulture industry.

The *Plant Protection Regulation 2002* declares the whole of Queensland to be a pest quarantine area to prevent the introduction of grape phylloxera into Queensland. This pest was known to occur in the Brisbane Metropolitan Area from the early 20<sup>th</sup> Century but has not been observed in areas outside of Brisbane. It has not been detected in Brisbane for over 40 years. Following a detailed submission from BQ, the NVHSC now recognises PRZ status for the Brisbane area as well as for the rest of Queensland. Grapevine material can only be introduced to Queensland under the conditions specified in an inspector's approval. For additional information refer to [www2.dpi.qld.gov.au/health/14282.html](http://www2.dpi.qld.gov.au/health/14282.html).

## South Australia

South Australia has specific legislation that is designed to minimise the potential for the introduction of grape phylloxera. The *Plant Health Act 2009* and the associated Plant Quarantine Standard provide the legislative framework for these controls. This includes the recognition of Interstate Certification Assurance (ICA).

Under the SA legislation, the import of grapevines (rooted vines, cuttings, or other propagules, excluding grapevine tissue cultures) grown in PIZ and PRZ areas of New South Wales, Victoria or Queensland are prohibited.

Plant material (cuttings, rootlings or graftlings) must be sourced from a PEZ. It must have originated in the PEZ or spent at least one season being grown in a nursery in the PEZ and is subject to hot water treatment and certification.

Grapes from a PIZ are prohibited except as packed table grapes with fumigation – either Methyl bromide or SO<sub>2</sub>/CO<sub>2</sub> (not yet approved) (see Plant Quarantine Standard – South Australia). Table grapes from a PRZ may enter with the inclusion of sulphur pads or fumigation (as above).

Movements of must or unfiltered juice into South Australia from a PIZ or PRZ are only allowed under an ICA arrangement. A winery wishing to import grape products under an ICA arrangement must comply with the conditions of the ICA, and be accredited by Primary Industries and Resources SA (PIRSA) to receive these products.

The ICA arrangement requires the grape processor, the transport operator and the receiving winery to adopt procedures prescribed in the National Phylloxera Management Protocol (refer to NVHSC on the GWRDC website [[www.gwrdc.com.au/nvhsc.htm](http://www.gwrdc.com.au/nvhsc.htm)] for a copy of the protocol). Each party must be accredited by the Department of Primary Industries in their respective state.

Fermented wine and filtered juice can be transported without specific legal restriction; however, the transport operator is required to follow the national procedure.

Further information on the ICA scheme is available from the PIRSA Plant Health Operations website [www.pir.sa.gov.au/planthealth/exporters/ica\\_and\\_compliance\\_arrangements](http://www.pir.sa.gov.au/planthealth/exporters/ica_and_compliance_arrangements) or contact the ICA Contact Officer on 1800 666 010.

A current map of the Phylloxera Management Zones in NSW, Vic and SA can be found at [www.phylloxera.com.au](http://www.phylloxera.com.au).

## Tasmania

Importation of any plants or plant material into Tasmania is regulated under the *Plant Quarantine Act 1997*. The requirements and procedures for the import and export of plants, plant products, and other prescribed matter are explained in the Plant Quarantine Manual (Edition 2 – 2008; see Table 9). Anyone wishing to import into Tasmania grapes, grape plants



and other potential vectors of grape phylloxera into the state must meet import requirements specified in the Plant Quarantine Manual. This document is available at the website of the Department of Primary Industries and Water ([www.dpiw.tas.gov.au](http://www.dpiw.tas.gov.au)) or by contacting Quarantine Tasmania (03 6233 3352).

## Victoria

Administrative authority for domestic quarantine in Victoria is vested in the Department of Primary Industries (DPI) under the *Plant Health and Plant Products Act 1995*. Inspectors have been appointed under this Act.

Control areas have been established in Victoria in order to prevent the entry, or the spread of pests. In regard to Viticulture pests, two types of control areas have been declared: PIZ to prevent the spread of phylloxera out of the infested areas, and PEZ to prevent the introduction of the pest into phylloxera free areas of Victoria (maps can be found at [www.phylloxera.com.au/regulation/zones.asp](http://www.phylloxera.com.au/regulation/zones.asp)). The movement of material between these zones generally requires a permit and certification issued by an Inspector, which is granted on written application if the conditions are met.

According to the *Plant Health and Plant Products Regulations 1996*, the movement into or throughout Victoria of any plant of the genus *Vitis*, including any table grapes, wine grapes, grape must and unfiltered juice, grape marc, germplasm, diagnostic samples, cuttings and rootlings, potted vines, or any agricultural equipment used to cultivate or harvest grapes or grape vines or any packages used to contain grapes or grape vines is prohibited unless the movement complies with either the conditions of a permit from an Inspector or the Interstate Quarantine Manual.

Under the *Plant Health and Plant Products Act 1995* a person who knows, or has reason to suspect that there is infestation of an exotic pest, must notify an Inspector of the infestation without delay by the quickest means of communication available. This includes anyone who has seen the pest on a property or has obtained a diagnosis on behalf of a landowner.

## Western Australia

Grapevine material must be brought into WA through quarantine. Failure to do so jeopardises the industry in Western Australia and may lead to prosecution under the *Plant Diseases Act 1914* and Regulations in 1989, which are due to be replaced by the *Biosecurity and Agriculture Management Act 2007* in 2009.

Approximately 200 grape varieties are currently held in Foundation Blocks by DAFWA. The local industry has access to these varieties through the Western Australian Vine Improvement Association ([www.agric.wa.gov.au/content/hort/vit/wavia\\_info2008.htm](http://www.agric.wa.gov.au/content/hort/vit/wavia_info2008.htm)). The Western

Australian Quarantine Inspection Service will assist prospective importers to obtain promising varieties held outside Western Australia.

## Vineyard level – exclusion activities

**Responsibility** > state and territory governments, industry/growers

The greatest risk of spreading pests in vineyards is when propagation material, grape juice, must, lees, people, machinery and equipment move from vineyard to vineyard and from region to region. It is the responsibility of 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 vineyard level, as this will reduce the probability of an incursion or outbreak and increase the probability of early detection. This should, in turn, reduce the likelihood of a costly incident response, thereby reducing costs to government, industry and the community.

## Surveillance, awareness and training

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Surveys enhance prospects for early detection, minimise costs of eradication and are necessary to meet the treaty obligations of the World Trade Organization's (WTO) SPS with respect to the area freedom status of Australia. Surveillance activities in the viticulture industry provide an important mechanism for gaining, retaining or maintaining international market access by providing information on absence of pests in Australia.

The SPS agreement gives WTO members the right to impose SPS measures to protect human, animal and plant life and health provided such measures do not serve as technical barriers to trade. In simple terms, for countries, such as Australia, that have signed the SPS Agreement, imports of food, including fresh fruit and vegetables, can only be prohibited on proper, science-based quarantine grounds. The agreement also stipulates that appropriate surveillance and monitoring are necessary to support claims of area freedom.

Structured pest surveys should be carried out under guidance of ISPM No. 6 (Guidelines for Surveillance; IPPC, 1997). Their 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 a pest 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, and if so, where these occur.

Industry personnel can provide very effective general surveillance as part of their normal management procedures, provided individuals are aware of what to look for and of reporting procedures. Viticulturists, non commercial growers, staff and consultants can provide valuable information as they are regularly in the field, and hence can observe any unusual pest activity or symptoms on plants.

Suitable awareness programs are required to support and encourage surveillance activities. These awareness programs can range from general information posters and sheets for tractor drivers, through to field day activities and professional courses. Awareness programs should also outline procedures (i.e. who to contact, where and how) so that industry personnel are able to have unusual plant symptoms or insects identified quickly. Promoting community awareness and reporting should be encouraged. Industry personnel need to be kept informed of areas within the local area where pest incursions exist so that they can take precautionary measures when working in or receiving produce from those areas.

## National surveillance programs

**Responsibility >** Australian Government

AQIS carries out surveillance at all international ports in Australia, including airports and sea ports. Imported agricultural commodities, machinery and other items, as well as passenger baggage and incoming mail, are subject to inspection on arrival by AQIS officers. AQIS also maintain inspection points throughout the Torres Strait region.

AQIS 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 surveys cover the coast from Cairns to Broome and extend up to 20 km inland.

NAQS maintain and regularly update target lists of pests with the potential to enter Australia via our northern borders. For more information visit [www.aqis.gov.au/naqs](http://www.aqis.gov.au/naqs).

## State and territory surveillance programs

**Responsibility** > state and territory governments, industry/growers

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

The various state and territory agriculture departments are responsible for:

- planning and auditing surveillance systems
- coordinating surveillance activities with those of industry and interstate groups
- provision of diagnostic services
- providing field diagnosticians for special field surveillance
- surveillance of non-commercial sites
- liaising with industry members
- developing communication, training and extension strategies with industry
- carrying out training
- reporting to all interested parties (AQIS, national bodies, trading partners and industry).

Various pest surveillance programs are managed by AQIS and the state and territory agriculture departments.

All states and territories take part in the National awareness program, 'Spotted anything unusual' which includes the Exotic Plant Pest Hotline (1800 084 881).

### New South Wales

Rigorous phylloxera ground surveys of commercial vineyards and amenity grapevines in PRZs were conducted by NSW Department of Industry and Investment between 2002 and 2005. Training was provided for officers undertaking the surveys. Phylloxera was not found and the status of the areas was upgraded from risk zones to exclusion zones in December 2006.

### Northern Territory

There is a structured surveillance program undertaken in the NT including the high priority area of exotic fruit flies. Through the NAQS program, AQIS also carries out general exotic pest surveillance activities along the coastal regions of the Northern Territory. NAQS also provide community awareness materials through the Top Watch awareness campaign.

In 2001, Grapevine leaf rust was detected in Northern Territory in a backyard planting which resulted in the National Grapevine Leaf Rust Eradication Program being established. In 2007, Grapevine leaf rust was declared eradicated following extensive surveillance and destruction of grapevines in Darwin.

## Queensland

Primary Industries and Fisheries undertake structured surveys under the Plant Biosecurity Surveillance Operations project. Surveys under this project target a range of hosts, pests, and geographic locations.

Some of the high-priority areas under this surveillance project include a trapping program for exotic fruit flies in high-risk urban areas associated with international ports and a survey program focussing on exotic pests that could initially establish in urban areas of Queensland.

AQIS also carries out general exotic pest and disease surveillance activities concentrated along the far northern coastal regions of Queensland as part of the Northern Australia Quarantine Strategy (NAQS).

In all areas of Queensland high priority is placed on community assisted surveillance, and effort is put into awareness, including training of growers. AQIS also provide community awareness materials through their “Top Watch” awareness campaign.

## South Australia

Formal plant health surveillance activities in SA include a comprehensive fruit fly monitoring program, formal surveys in relation to produce exports (e.g. onion smut, PCN and bacterial wilt of potatoes), a ports surveillance program (exotic fruit flies and Asian gypsy moth) in conjunction with OCPPO, and assistance with a “ground truthing” program in support of the aerial surveillance program for phylloxera which is currently being undertaken by the Phylloxera and Grape Industry Board of South Australia (PAGIBSA).

PIRSA maintains a passive surveillance program via the diagnostic laboratories at SARDI. Samples of suspected exotic pests and diseases are initially screened at no cost to the grower/consultant.

PAGIBSA provides growers with information on exotic pests and diseases (e.g. glassy winged sharpshooter, Pierce’s disease, etc.).

## Tasmania

The Department of Primary Industries and Water (DPIW) conducts regular surveys for several exotic pests and diseases around sea and air ports and major agricultural centres, several in

conjunction with the Office of the Chief Plant Protection Officer (OCPPO). DPIW also provides diagnostic services for suspect material intercepted at the quarantine border or forwarded to the Department from growers and the community. The DPIW also conducts biosecurity awareness programs to encourage reporting of unusual pests or disease symptoms.

## Victoria

The DPI runs a passive surveillance program whereby suspect samples can be forwarded and diagnosed for the presence of exotic pests and diseases. Victoria conducts surveillance each year for one or more selected exotic pest threats, and within this program has undertaken surveillance for Pierce's disease.

Community awareness about pests and diseases is disseminated to industry through the Grapecheque program, via newsletters and direct contact with regional grape growing associations and the Grapecheque facilitators. John Whiting, the Senior State Viticultural Officer, DPI is the Team Leader of the Grapecheque program.

The DPI in Rutherglen runs annual Phylloxera Identification and Management Workshops. For further information contact Dr Kevin Powell, leader of the Phylloxera Research Team (DPI Rutherglen), (02) 6030 4500.

## Western Australia

AQIS carries out general exotic pest surveillance activities concentrated along the far northern coastal regions of Western Australia.

The DAFWA 'HortGuard Biosecurity plan for the Viticulture Industry' ([www.agric.wa.gov.au/content/pw/ph/index\\_hortguard.htm](http://www.agric.wa.gov.au/content/pw/ph/index_hortguard.htm)) provides grower awareness material and fact sheets for exotic threats that are considered to present a high risk to the industry, such as Pierce's disease and Black rot. Fact sheets for high risk interstate threats include phylloxera, grapevine fanleaf virus and the black vine weevil. This document can be obtained from the DAFWA. AQIS also provides community awareness materials through their "Top Watch" awareness campaign.

## Vineyard surveillance activities

**Responsibility >** industry/growers

Industry representative groups may contribute toward the provision of effective surveillance through a range of activities, particularly those that are on farm. Growers, consultants and extension officers are regularly in the field including monitoring crop health.

Examples include:

- implementing surveillance on commercial properties
- liaising with agriculture departments
- reporting suspect pests
- provision of on-farm surveillance records
- coordination of grower surveillance
- funding commercial surveillance activities
- working with agriculture departments to develop awareness, training and extension programs
- carrying out training.

Agri-businesses participate in surveillance by increasing general pest awareness and providing diagnostic services. Specific actions that contribute to surveillance include:

- distribution of extension materials
- assistance with training
- receiving suspect samples
- supplying surveillance equipment (e.g. traps and diagnostic kits)
- providing diagnostic services to growers.

Grower roles and responsibilities include:

- implementation of surveillance on properties (where possible)
- reporting suspect pests
- provision of records of on-farm surveillance
- attending training; providing awareness and training to staff
- meeting state and territory agriculture department and industry surveillance requirements
- ensuring identification material and sampling kits are available for staff.

## Vineyard biosecurity/hygiene

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The following sections of this document deal specifically with guidelines for vineyard biosecurity. Specific focus areas include:

- avoidance of pest spread by selecting appropriate planting materials
- reporting neglected vineyards or feral grapevines
- control of pest vectors

- control of alternative hosts
- destruction of crop residues
- integration of biosecurity awareness into post-harvest handling and transport procedures
- use of warning and information signs for biosecurity awareness
- use of dedicated equipment in high risk areas
- restriction of people and vehicle movement in high risk areas
- the relationship between vineyard biosecurity protocols and Industry Best Management Practice (IBMP) and Quality Assurance (QA) schemes.

## Selection and preparation of appropriate planting materials

### Obtaining pest and pathogen free planting material for crop production

**Responsibility** > national border control (Australian Government), intra- and interstate border controls (state and territory governments), industry/growers

Vine material and/or their products should be screened for pests before distribution and sale. Infected planting material can be the main source of spread for some diseases. Soil carried on plants can harbour pathogens or other hidden pests such as nematodes. The preferred pathway for avoiding introduction of pests on planting material is to use tissue cultured plants.

Planting materials that have been certified as being free of pests and pathogens provide a useful safeguard for growers. Growers should seek out propagation materials that are certified to be free of pests where possible. The value of certified planting material is enhanced if the parent crops have been grown in pest free areas. As with movement restrictions, many of the requirements for pest free planting material relate to vineyard hygiene measures to control phylloxera. Many of these requirements also provide potential benefits for limiting the establishment and spread of other pests.

### VINE INDUSTRY NURSERY ASSOCIATION

The Vine Industry Nursery Association (VINA) is a national body which comprises 60 members nationally, including nurseries, vine improvement groups and grape growers who have nursery source blocks on their property. VINA runs a VINA-facilitated accreditation program with the aim of delivering high-health vine material to the Australian viticulture industry.

Membership is open to any interested vine nursery operator and may include elected representatives from any grape growing or winemaking organisations, and owners of



approved or certified vine propagation material. A full list of members can be found on the VINA web site ([www.vina.net.au](http://www.vina.net.au)).

The objectives of VINA are:

- to represent and promote the interests of vine nurseries in matters of general interest that may affect their well being and viability
- to coordinate the efforts of vine nurseries in order to give unity of purpose and strength in the best interests of vine nursery development
- to provide a channel for communication and dissemination of information between vine nursery operators and other sectors of the grape and wine industry
- to present nurseries' views to national and regional grape and wine industry bodies
- to discuss common issues and share technical information
- to provide mutual support, especially with legal issues
- to promote education within the group and also to customers
- to provide input to research organisations to prioritise research applicable to nurseries
- to encourage best practice and maximum operating and product standards
- to facilitate and promote the principles of the Vine Industry Nursery Accreditation Scheme (VINAS).

It is a requirement of the Accreditation Scheme that only accredited nurseries can sell certified planting material.

### NEW SOUTH WALES

Conditions apply to the movement of grape planting material imported into NSW from phylloxera risk zones or infected zones. Grapevines and planting material are allowed to move freely within the NSW PEZ. See [www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases](http://www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases) or for information on phylloxera in NSW see NSW DPI Primefact [www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0014/116402/grape-phylloxera-the-worlds-worst-grapevine-pest.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0014/116402/grape-phylloxera-the-worlds-worst-grapevine-pest.pdf).

### NORTHERN TERRITORY

Growers require a permit from a DRDPFR Chief Inspector before importing viticulture planting material into the NT.

### QUEENSLAND

Plants entering Queensland must be certified as complying with the quarantine regulations for viticulture planting material. Information on these entry conditions is available from the QPIF website ([www2.dpi.qld.gov.au/health/14282.html](http://www2.dpi.qld.gov.au/health/14282.html)) or by calling Biosecurity Queensland on 13 25 23 or 07 3404 6999. Biosecurity Queensland will assist prospective importers to obtain promising varieties held outside Queensland.

## **SOUTH AUSTRALIA**

Within South Australia there are several sources of grapevine planting material of tested status. South Australian Vine Improvement Incorporated (SAVII) is one such source.

## **TASMANIA**

Import Requirement 10 of the Plant Quarantine Manual (Edition 2, 2008) deals specifically with the import of grapes, grape plants and other potential vectors of grape phylloxera. Grape plants must be imported in the form of un-callused cuttings, or callused cuttings (grafted or ungrafted) or tissue-cultured material from an approved source. Callused cuttings must be free of roots, although some small amount of early root development will be tolerated. Rootlings are not permitted entry into Tasmania (rootlings are defined as plants that have been callused and grown-on in soil or any other medium).

Other conditions apply to the importation of grape planting material into Tasmania including that it must be presented to Quarantine Tasmania on arrival for physical inspection. The Plant Quarantine Manual (Edition 2 – 2008) is available at [www.dpiw.tas.gov.au](http://www.dpiw.tas.gov.au) or contact Quarantine Tasmania (03 6233 3352).

## **VICTORIA**

It is recommended that certified plant material be obtained from a reliable source. High quality planting material should be purposed from a nursery that sources certified propagating material from one of the vine improvement associations that operate in each state. The nursery should also be either an AVIA (Australian Vine Improvement Association) accredited nursery or belong to the Vine Industry Nursery Association (VINA).

The importing of planting material from intrastate, interstate, or from overseas must be certified to meet import conditions.

## **WESTERN AUSTRALIA**

In Western Australia it is recommended that planting materials should only be purchased if they have been grown and prepared with the aim of minimising the risk of spread of pests and diseases to the area. Information on quarantine regulations for viticulture planting material in Western Australia can be obtained from DAFWA ([www.agric.wa.gov.au/quarantine](http://www.agric.wa.gov.au/quarantine)). DAFWA will assist prospective importers to obtain promising varieties held outside Western Australia. See also Western Australian Vine Improvement Association ([www.agric.wa.gov.au/content/hort/vit/wavia\\_info2008.htm](http://www.agric.wa.gov.au/content/hort/vit/wavia_info2008.htm)).

## Use of chemical control measures to eliminate pests and pathogens from planting materials

**Responsibility** > industry – drawing on advice from government and non-government research agencies

Chemical control programs for selected organisms may be instituted during crop growth to reduce or eliminate pests from planting materials. If these procedures are lacking, then propagation material may be treated before planting. Only registered products should be used.

Agriculture departments should identify and list suitable chemical control measures for high priority exotic pests, and put into place procedures for the emergency registration of necessary chemicals that may be unavailable. The Australian Pesticides and Veterinary Medicines Authority (APVMA) is the national authority responsible for registration and deregistration of chemicals and can be contacted on (02) 6272 5852. The APVMA Permit Section deals specifically with emergency registrations for chemicals. Further information can be obtained from the APVMA web site at [www.apvma.gov.au](http://www.apvma.gov.au).

## Use of pest resistant varieties

**Responsibility** > industry – drawing on advice from government and non-government research agencies

Resistant varieties provide one of the most successful approaches to the control of pests in many crops. Vine and rootstock breeding programs are no longer carried out through state departments. The Grape and Wine Research and Development Corporation has financially supported some research in this area as has CSIRO and to some degree SARDI (SA) in partnerships. For more information regarding vine and rootstock varieties, and their potential resistance to the high priority pests (Table 5), visit the GWRDC ([www.gwrdc.com.au](http://www.gwrdc.com.au)), PGIBSA ([www.phylloxera.com.au](http://www.phylloxera.com.au)), AVIA ([www.avia.org.au](http://www.avia.org.au)), and SAVII websites or contact the organisations directly. Information on accredited nurseries can be found through VINA ([www.vina.net.au](http://www.vina.net.au)).

## Control of vectors

**Responsibility** > industry – drawing on advice from government and non-government research agencies

Viruses, phytoplasmas and some bacteria require a vector to provide a means of dispersal. Vectors are commonly invertebrates such as insects and mites. Nematodes, fungi, birds, people and machinery can also serve as vectors of plant pathogens. The activity and mobility of the vector, including seasonal patterns, determines the rate and distance of dispersal. Consideration should be given to the control of known vectors of plant pathogens.

Inspection and cleaning of vehicles, machinery and equipment (such as pruning tools) helps to prevent pest spread, as does cleaning footwear and restricting unnecessary people movements around the vineyard. Consideration should also be given to the control of known vectors of plant pathogens when new disease outbreaks are likely.

Chemicals can have a number of potentially adverse effects on the production and marketing of grapes products and should therefore be used with due care. Potential issues include chemical residues on produce that may limit market access, and chemical resistance that may develop in target pests.

Integrated Pest Management (IPM) practices, such as the use of natural enemies and pheromone traps, can be effective methods of controlling vectors and managing the threat of insecticide resistance. Advice on IPM and control of viticulture pests can be obtained from your local state and territory agriculture department and from the CSIRO ([www.csiro.au](http://www.csiro.au)).

## Control of alternative hosts

**Responsibility** > industry – drawing on advice from government and non-government research agencies

Alternative hosts of plant pests can provide reservoirs of pests which can potentially become established in ensuing viticulture crops. Weeds, volunteer re-growth and crops grown in rotation or association with grapevines can act as alternative hosts. Management and surveillance of alternative hosts is an important pest prevention strategy, with many of the viticulture pests listed in the TSTs (Appendix 1) having multiple host species.

## Control of weeds

Weed species are significant biosecurity problems in their own right as well as acting as alternative hosts of plant pests. Weed control practices can significantly contribute to limiting

the survival of pathogens and reducing the potential for outbreaks. Refer to Table 14 and Table 15 for pest-specific documents related to high priority pests of the viticulture industry, which contain information on alternative hosts (where applicable).

### Control of volunteers/re-growth

Volunteer host plants may establish around cropping areas if climatic conditions are suitable. This is an issue of concern as volunteer plants can provide sources of disease inoculum and harbour insect pests, which can become established in subsequent crops. Strategies to destroy these volunteer hosts (e.g. cultivation and/or the use of herbicides) should be adopted.

Where infected plants are removed, soil erosion should be minimised by revegetating the site with non-host plant species. Grasses, being rare hosts of viticulture pests, are commonly used as revegetation species. In the case of soil and water borne diseases, management of erosion and runoff water are particularly important. Containment measures will vary according to the pest involved. Contingency plans, where available, provide sources of information on the specific management protocols for each pest. Specific advice should be sought from the relevant state or territory agriculture department.

## Destruction of crop and processing residues

**Responsibility** > industry – drawing on advice from government and non-government research agencies

Protocols for treatment of waste emanating from vineyards and processing plants should be developed and promoted. As many plant pests survive on crop residues and crop by-products, residues should be treated responsibly. Burying, burning or removing crop residues, and cleaning equipment and machinery are effective cultural practices that may be adopted.

## Neglected vineyards/feral vines

**Responsibility** > governments, industry

Neglected vineyards and feral vines potentially pose a biosecurity risk to the viticulture industry, as they can allow pests to multiply, and spread. Suspected neglected vineyards should be reported to the relevant state/territory agricultural department or the local council. After reporting, appropriate steps may be taken by the relevant authority to ensure that feral or neglected plants do not carry regulated pests or weeds or pose a risk to adjacent vineyards. Authority to deal with neglected vineyards is covered in state/territory legislation (Table 9).

## Post-harvest handling and produce transport procedures

**Responsibility** > industry – drawing on advice from governments and non-government research agencies

Industry produce transport procedures that minimise the risk of pest movement (including transporting soil and plant matter) should be developed and promoted.

Cleaning cartage and transport equipment before entering farms and after transporting grapes from infected vineyards or areas will help minimise the chance of pest movements. Grapes should be loaded onto trucks on a concrete or tarmac pad outside the vineyard area. Vineyards which move grapes to another vineyard or region for processing should maintain an effective pest monitoring and management program.

All vineyards supplying grapes should have access to a high-pressure wash down facility that is associated with a concrete or tarmac pad. It is preferable that this facility is located on the property, or failing this, close to the property. At a minimum wash down facilities should be located within the same region as the property. Detergent based disinfectants should be used, and water from the wash down facility should not be directed back into the vineyard or the vineyard irrigation water supply.

Vineyards from which fruit is to be taken and transported to another vineyard or region for processing should maintain an effective monitoring/pest management program. A spray diary record should accompany each consignment of grapes, must, juice and lees. Grapes should be loaded onto trucks on a concrete tarmac pad outside the vineyard area. Picking buckets, crates and bins must be cleaned of all soil and vegetable matter before being taken into the vineyard.

They should also be cleaned if they are to be used for transporting grapes to another vineyard or region. Table grapes require extra care when grapes are being packed in the field to ensure no soil, leaf material or insects adhere to or are in the crate, carton or any other grape container.

Produce should be transported securely to prevent spillage. Receivers should also be informed if the material has come from an area that may have a pest incursion.

Some states and territories place restrictions on the introduction or movement of grapes, for example the use of certain transport routes, container types or consignment management procedures. Transporters should check with state authorities whether such obligations exist (see Barrier Quarantine section, page 38).

A produce identification and tracing system will assist in tracing consignments to their source if contaminated with an exotic pest. All fruit consignments should be clearly marked with the name of the grower, and a batch identification mark (date or other code). Growers should maintain a record of the source and destination of each batch, and identify separate growing areas on a property map.

## Use of warning and information signs

**Responsibility > industry**

Placing warning and information signs on the entrances and gates of properties can help inform visitors of the biosecurity practices in place, and reminds industry personnel that farm biosecurity is a priority. Signs should also include up-to-date contact details for people to gain further information. Visitors to the area may not be aware of relevant biosecurity protocols.

All people entering the property should have a clear view of any informative signs. Signs should contain simple messages (e.g. do not enter the vineyard without prior approval, use wash down facilities for cleaning vehicles and machinery, etc.). Examples are shown in Figure 5.

**Figure 5.** Examples of biosecurity warning signs



## Use of dedicated equipment when working in high risk areas

**Responsibility > industry, governments**

It may be practical to assign equipment (including clothing, tools and footwear) to be used in pest infested or infected areas only. This means that the equipment used in infested or infected vineyards or productions areas is not reused in clean areas – and *vice versa*.

## Managing the movement of vehicles, equipment and people

A high risk of spreading pests comes from movements of people, machinery and equipment between regions and vineyards. This risk can be reduced by ensuring plant material and soil that may harbour pests are not moved to other properties or regions.

### National controls

**Responsibility >** Australian Government

The Australian Government is responsible for the inspection of machinery and equipment being imported into Australia. Administrative authority for national quarantine is vested in AQIS under the Commonwealth *Quarantine Act 1908*. Any machinery or equipment being imported into Australia must meet quarantine requirements. If there is any uncertainty, contact AQIS on (02) 6272 3933 or 1800 020 504.

### State controls

**Responsibility >** state and territory governments

The movement of machinery and equipment between states and territories may be subject to restrictions. A summary of the movement restrictions in state/territory legislation in relation to viticulture is shown in Table 10. Additional details can be obtained by contacting our local department of primary industries or through the DQMAWG website ([www.dqmawg.org.au](http://www.dqmawg.org.au)).

**Table 10.** State and territory restrictions on movement of machinery and equipment

| State | Administering authority | Legislation                            | Control procedures   |
|-------|-------------------------|--|--|
| NSW   | NSW DII                 | <i>Plant Diseases Act 1924</i>         | Movement into NSW of machinery or equipment that has been used in a vineyard is regulated because of the risk of phylloxera. Compliance with written conditions of movement or by obtaining a specific written approval may allow movement to occur.<br><br>See <a href="http://www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases">www.dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases</a> |
| NT    | DRDPIFR                 | <i>Plant Diseases Control Act 1979</i> | Prior to the movement of machinery and equipment into the NT details should be obtained from the Chief Inspector for any conditions that may apply.  |
| QLD   | BQ, DEEDI               | <i>Plant Protection Act 1989</i>       | Movement of used vineyard machinery and equipment into Queensland is prohibited without prior approval by a BQ Officer.  |



| State | Administering authority  | Legislation  | Control procedures  |
|-------|--|--|---|
| SA    | PIRSA  | <i>Plant Health Act 2009, Plant Quarantine Standard – SA</i>     | Grapevine equipment including harvesters must not enter SA from States where grape phylloxera is present unless it has been subject to specified cleaning and disinfestation against grape phylloxera (e.g. steam cleaning or specified heat treatment), or has been operated in an area free of phylloxera for a specified time.   |
| TAS   | DPIW   | <i>Plant Quarantine Act 1997, Weed Management Act 2000</i>       | Requirements regarding the inspection and cleaning of agricultural equipment coming to Tasmania are covered by the <i>Plant Quarantine Act 1997</i> (Section 55) and the <i>Weed Management Act 2000</i> . These requirements are outlined in the Plant Quarantine Manual. Machinery and equipment must be clean of any visible soil, plants, and plant material or any other thing that may harbour a pest or disease agent upon arrival in the State. Machinery and vehicles that have been used in certain areas (e.g., Phylloxera Zone) require an approved treatment before being allowed entry into Tasmania. |
| VIC   | DPI Victoria   | <i>Plant Health and Plant Products Act 1995</i>                  | <p>The movement into Victoria of any agricultural equipment used to cultivate or harvest grapes is prohibited unless it has been certified as coming from a PEZ or certified that it has been cleaned free of soil and plants and treated in the approved manner (e.g. steam cleaning or hot roomed).</p> <p>The movement within Victoria of any agricultural equipment used to cultivate or harvest grapes, into a PEZ or out of a PIZ is prohibited unless it is free of soil and plants and has been treated in a approved manner and accompanied by a permit and certification.</p>                             |
| WA    | DAFWA. Western Australian Quarantine and Inspection Service (08) 9311 5333 | <i>Plant Diseases Act 1914 and Regulations 1989<sup>10</sup></i> | Used vineyard machinery is restricted entry into Western Australia from overseas and interstate. Entry is only permitted subject to a permit under prescribed conditions. Further details can be obtained from the Plant Health Policy Officer on 9368 3859.  |

## Vineyard/regional activities

### Responsibility > industry/growers

It is in the interests of industry to encourage and monitor the management of biosecurity risks at the vineyard level, as this will reduce the probability of an incursion or outbreak and increase the probability of early detection. This should in turn reduce the likelihood of a costly incident response, thereby reducing the costs to the industry, governments and the wider community.

<sup>10</sup> Due to be replaced by *Biosecurity and Agriculture Management Act 2007* in 2009

Suggested practices for minimising pest spread at the vineyard level include:

- restricting the movement of vehicles and people during high-risk periods. This may include avoiding moving vehicles and machinery if roads are wet and muddy
- ensuring machinery, vehicles and equipment (secateurs, grafting knives, hand post hole rammers) entering or leaving properties are free of soil and crop debris
- providing wash down facilities (e.g. high pressure hose with a concrete or tarmac pad, scrubbing brushes and footbaths) at the entry to the property. The provision of detergent based disinfectants is essential
- minimising movements of non-farm vehicles around the vineyard (especially when the soil is wet)
- providing employees with a designated parking area
- ensuring all visitors to the cellar door sales/restaurant area park their cars in an area designated specifically for this purpose
- ensuring all business people entering the property report directly to the office on arrival
- ensuring visitors and employees clean any 'loose' dirt and vegetable matter from their footwear and clothing, if they have been amongst the vines, before leaving the property
- providing wash down facilities (e.g. scrubbing brushes, detergent and footbaths) for persons entering or exiting the vineyard. The water and soil from these wash down facilities should not go into the vineyard or the vineyard irrigation water supply
- reporting all suspected exotic pests to the Exotic Plant Pest Hotline (1800 084 881).

Inspection and cleaning of machinery should be done before movement of machinery between vineyards and other properties. Wash down facilities should be provided at the entrance of the property for contractors and other visitors to use before entering and leaving the property. Vehicle movement around the vineyard should be kept to a minimum (especially when the soil is wet).

All vineyard owners/managers should visually inspect machinery and equipment before it comes onto their property to ensure it is in accordance with appropriate hygiene standards. Access should be denied to any machinery or equipment that is not free of soil and plant material. Key issues to be aware of include:

- small items of equipment (e.g. secateurs, grafting knives, hand post hole rammers) should be cleaned of all soil and vegetable matter before being taken onto and leaving a vineyard. Growers should consider providing itinerant workers with such equipment, to reduce the chances of pests and diseases entering their farms. This is especially important in the case of itinerant workers who go from property to property during the pruning and harvesting seasons.

- palecons should be free from soil before loading onto trucks
- all palecons, bin exteriors and more complex machinery (e.g. mechanical harvesters, trimmers, leaf pluckers, trailers, tractors and trucks [including tankers]) should be washed down with high pressure to remove soil and vegetative matter on a concrete or tarmac pad before the truck leaves the property. If there is no wash down facility on the property then it should be in close proximity to the property and definitely within the region from where the machinery and equipment is being moved
- water from the wash down stand should not flow into vineyards or vineyard irrigation water supplies, and be directed into non-production areas.

## Including vineyard biosecurity in IBMP and QA schemes

**Responsibility > industry**

Maintaining a strong overall vineyard biosecurity (farm hygiene) regime will greatly reduce the risk of uncontrolled spread of all pests. The following measures are recommended at the vineyard level to provide protection from pests:

- using pest free propagating material
- inspecting all incoming vehicles and equipment for signs of contaminated soil or vine material, and enforcing high biosecurity standards
- using high pressure wash-down facilities associated with a concrete or tarmac pad for cleaning vehicles and containers, with disposal of effluent away from vines and irrigated sources
- disposing of fruit and vine residues away from established vines
- undertaking a biosecurity/quarantine education and training program for employees and related personnel
- having a planned, effective monitoring and pest management program
- erecting information signs at the entrance of the property which outlines the basic biosecurity requirements for all visitors
- reporting all suspect vines and pests for identification
- minimising vehicle movement around the vineyard (especially when the soil is wet)
- including vineyard biosecurity measures in QA systems
- frequently cleaning hand tools and other items used on vines
- disposing of unwanted vines and reporting neglected vineyards
- training staff in correct use of farm chemicals
- managing people movement around the vineyard by using vehicles which remain on the property, and supplying footwear or footbaths
- separating public sales and tourist activities from the vineyard production areas
- maintaining accurate spray diaries.

Including these measures in IBMP and QA schemes will strengthen the viticulture industry's ability to detect, control and eradicate emergency plant pest outbreaks rapidly, before extensive damage occurs. Commonly used IBMP and QA schemes that apply to the viticulture industry are listed in Table 11.

**Table 11.** *Industry best management practice and quality assurance schemes*

| Scheme  | Key areas of biosecurity relevance   |
|---|--|
| Australian Winegrape Industry Quality Accreditation Committee Incorporated (AWIQAC) | Australian Winegrape Industry Quality Accreditation Committee Incorporated (AWIQAC) is a non-profit organization set up to develop national quality assurance standards for Australian wine grape production and has equal representation by wineries and growers.   |
| Good Viticulture Practice (GVP)   | Good Viticulture Practice (GVP) was developed by AWIQAC in 2001 as a simple and low cost set of standards based on a national checklist.   |
| Winegrape Care  | Winegrape Care is a HACCP and ISO 9000 based standard requiring third party auditing, it was introduced in 1998 with over 800 participants.  |
| Code of Good Manufacturing Practice for the Australian Grape and Wine Industry      | <p>The Code of Good Manufacturing Practice for the Australian Grape and Wine Industry prepared by the Australian Wine Research Institute. It is based on a similar document developed in New Zealand. It outlines the basic practices that should be adopted in vineyards and wineries to ensure that safe and sound quality products result.</p> <p>The document can be obtained from the Australian Wine Research Institute website at <a href="http://www.awri.com.au">www.awri.com.au</a>.</p>             |
| Dried Grape Approved Supplier Program (DGASP)                                       | <p>The Dried Grape Approved Supplier Program (DGASP) is a low level, Hazard Analysis and Critical Control Points (HAACCP) based QA system. It is accepted industry-wide with an estimated 98% of growers having completed the training and being recognized as current 'Approved Suppliers'. Training is still required for new comers to the industry or where there has been a change in family farm composition/management.</p> <p>Additional details on this scheme are shown in the case study below.</p> |
| Vine Industry Nursery Association Scheme (VINAS)                                    | VINA has a QA and intensive product tracking programme available to nurseries through the Vine Industry Nursery Accreditation Scheme (VINAS). A QA manual has been produced and is used as a reference by an independent auditor appointed by VINA for annual accreditation audits. All accredited nurseries have a copy of the QA manual. A list of all accredited nurseries can be found on the VINA web site ( <a href="http://www.vina.net.au">www.vina.net.au</a> ).                                      |

## Vineyard biosecurity checklist

Use this checklist to do a quick biosecurity assessment of your property, and see sections of this document for further detail on each point.

| Farm biosecurity checklist  | Yes | No |
|---|-----|----|
| Do you have information signs placed at the entry gate to demonstrate your hygiene/biosecurity measures?                                    |     |    |
| Do you maintain secure boundary fences?   |     |    |
| Do you provide movement controls (people and vehicles) and wash down areas/footbaths to prevent spread of pests onto your property?         |     |    |
| Do you have designated parking for visitors?  |     |    |
| Do you provide on-property transport for visitors?  |     |    |
| Has visiting machinery been cleaned correctly?  |     |    |
| Do you use pest-free planting material?   |     |    |
| Do you ensure that your and staff are adequately trained in the correct use of pesticides?  |     |    |
| Do you provide biosecurity training and awareness for vineyard staff?   |     |    |
| Do you use quality assurance and/or best management practice systems?   |     |    |
| Have you sought advice from a vineyard consultant in developing and implementing your vineyard's biosecurity plan?                          |     |    |
| Have you been to an overseas farm or a suspect area? Wash your clothes, boots and hair, and declare your international visit to quarantine! |     |    |

Further information in relation to vineyard biosecurity can be found at the farm biosecurity website ([www.farmbiosecurity.com.au](http://www.farmbiosecurity.com.au)).

[www.farmbiosecurity.com.au](http://www.farmbiosecurity.com.au)

## Reporting suspect pests

EXOTIC PLANT PEST HOTLINE  
**1800 084 881**

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

Reporting an exotic plant pest carries serious implications and should be done only via the Exotic Plant Pest Hotline. Careless distribution or sharing of information, particularly if a pest has not been confirmed, can result in extreme stress for individuals and communities, and possibly damaging and unwarranted trade restrictions.

**If you suspect a new pest, call the Exotic Plant Pest Hotline on 1800 084 881**

Calls to the Exotic Plant Pest Hotline will be forwarded to an experienced person in the department of agriculture from the state of origin of the call, who will ask some questions about what you have seen and may arrange to collect a sample. Every report will be taken seriously, checked out and treated confidentially.

In some states and territories, the Exotic Plant Pest Hotline only operates during business hours. Where this is the case, and calls are made out of hours, callers should leave a detailed message with current contact information so that staff from the relevant department of agriculture can return the call the following business day.

Some viticulture pests are notifiable under each state or territory's quarantine legislation<sup>11</sup>. Landowners and consultants have a legal obligation to notify the relevant state/territory agriculture department of the presence of those pests within 24 hours of detection.

Suspect material should not generally be moved or collected without seeking advice from the relevant state/territory department, as incorrect handling of samples could spread the pest or render the samples unsuitable for diagnostic purposes. State/territory agriculture department officers will usually be responsible for sampling and identification of pests.

**Figure 6.** Postcards from Plant Health Australia's Plant Health Awareness Campaign



<sup>11</sup> The complete list of notifiable pests is available at [www.planthealthaustralia.com.au/biosecurity](http://www.planthealthaustralia.com.au/biosecurity)

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# **CONTINGENCY PLANS AND RESPONSE MANAGEMENT PROCEDURES**



## Introduction – emergency response

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Gathering information, developing procedures, and defining roles and responsibilities during an emergency can be extremely difficult. To address this area, Plant Health Australia (PHA) has developed PLANTPLAN, a national set of incursion response guidelines for the plant sector, detailing procedures required and the roles and responsibilities of all parties involved in an incursion response.

Following PLANTPLAN, a set of threat-specific contingency plans will be developed to cover the key pests to the viticulture industry. These pests are detailed in the viticulture plant pest priority list (Table 5) and have been identified through a process of qualitative risk assessment. Information will be provided on the host range, symptoms, biology and epidemiology of each organism, along with guidelines for general and targeted surveillance programs, diagnosis, and control. These documents are designed to assist with the development of response plans and will be used in conjunction with the emergency response guidelines in PLANTPLAN.

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

## PLANTPLAN

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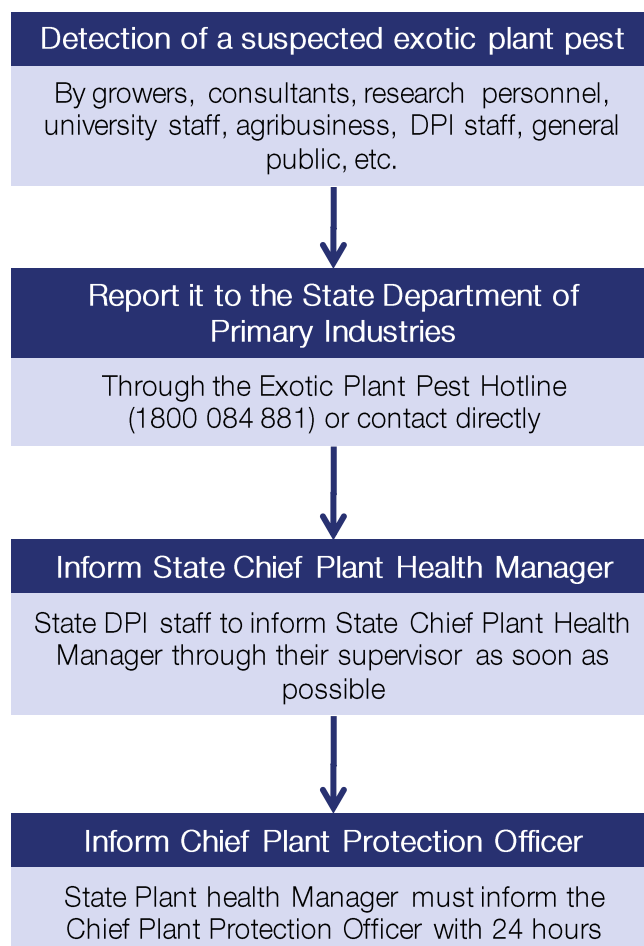
PLANTPLAN provides a description of the general procedures, management structure and information flow system for the handling of a plant pest emergency at national, state/territory and district levels. This includes the operations of the control centres, principles for the chain of responsibility, functions of sections and role descriptions. PLANTPLAN is a general manual for use by all jurisdictions for all plant pest emergencies.

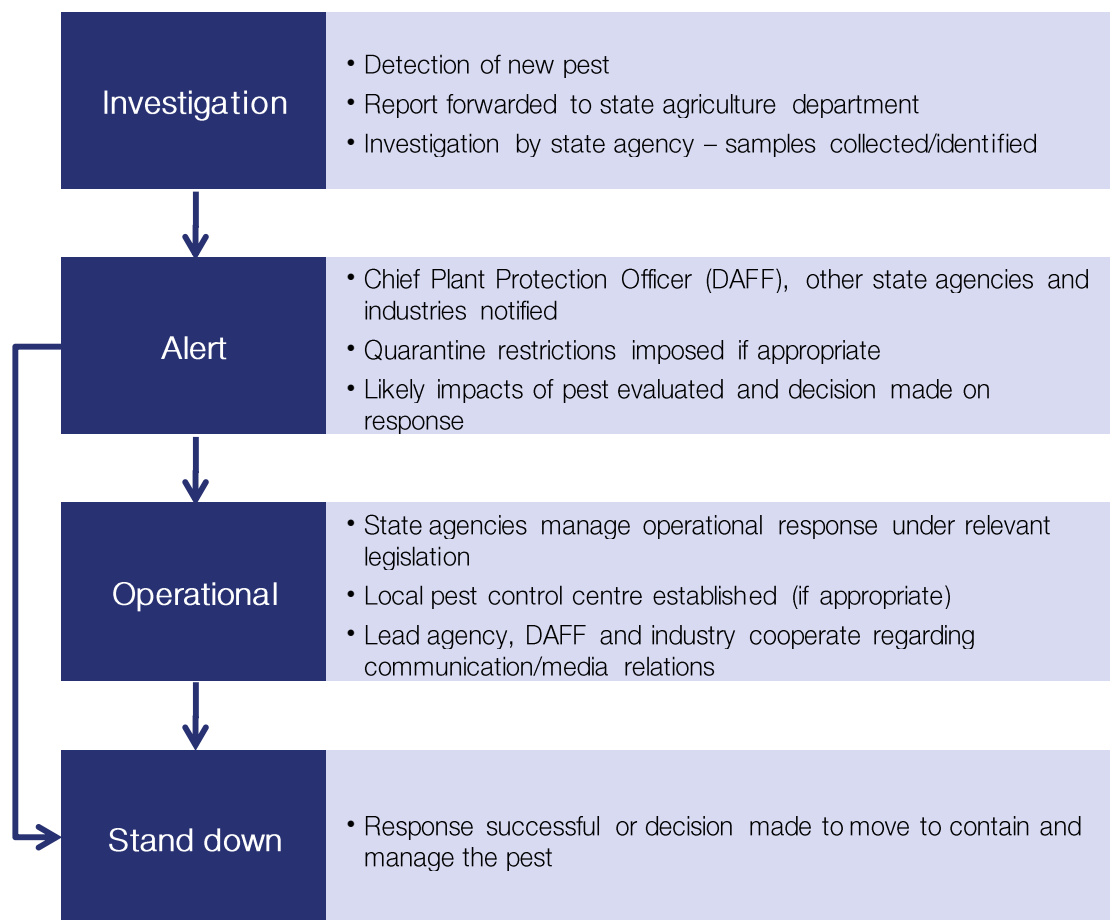
PLANTPLAN is regularly reviewed and updated to ensure it provides the best possible guidance to plant industries and governments in responding to serious plant pests. The most recent version of PLANTPLAN can be downloaded from the PHA website ([www.planthealthaustralia.com.au/plantplan](http://www.planthealthaustralia.com.au/plantplan)).

## Current response management procedures

Following the detection of a suspect emergency plant pest, the relevant state agency should be immediately notified, either directly or through the Exotic Plant Pest Hotline. Within 24 hours of the initial identification, the agency, through the State Plant Health Manager, will inform the Office of the Chief Plant Protection Officer (OCPPO) which will notify other relevant Australian Government Departments and relevant state agencies and industry representatives (process outlined in Figure 7). Following the detection or reporting of the pest, the relevant state/territory agriculture agency may collect samples of a suspect organism and seek a positive identification. If the pest is suspected to be an exotic pest (not yet present in Australia), the general process is as outlined in Figure 8.

**Figure 7.** Emergency plant pest detection reporting flowchart



**Figure 8. General decision making and communication chain for an EPP response<sup>12</sup>**

If the pest is considered potentially serious, then the relevant state/territory agriculture department may adopt precautionary measures. These measures, depending on the pest, may include:

- restriction of operations in the area
- withdrawal of people, vehicles and machinery from the area and disinfection
- restricted access to the area
- interim control or containment measures.

If an exotic plant pest is confirmed, technical and economic considerations are reviewed, and a decision made on whether to eradicate, contain or do nothing about the incursion (depending on the feasibility of the response and likely costs and impacts of the pest). Under

<sup>12</sup> The figure and information provided above is a general guide. For more detailed information on how pest responses are managed, please refer to PLANTPLAN

the EPPRD all decisions are made by Committees with government and industry representation.

During this investigation/alert period, the affected area will be placed under quarantine until a decision is made on whether to eradicate or control the pest. Once a decision has been made on a suitable response, efforts enter the operational phase. Eradication or control methods used will vary according to the nature of the pest involved and infested material will be destroyed where necessary. All on ground response operations are undertaken by the relevant state department(s) in accord with relevant state/territory legislation (Table 9).

In the stand down phase, all operations are wound down. Where a plant pest emergency was not confirmed, those involved will be advised that the threat no longer exists. Where an eradication or management/control campaign has taken place, quarantine measures will be reviewed.

## Industry specific response procedures

### Grower support and counselling services

Provision for counselling and advice on financial support for growers is made available through various agencies as listed in Table 12. Up-to-date information relating to mental health can be found at [www.health.gov.au/mentalhealth](http://www.health.gov.au/mentalhealth). Local providers of counselling services can be found through contacting your local state or territory agriculture agency or your growers association.

**Table 12.** *Counselling and financial counselling services*

| Organisation | Contact   |
|--------------|---|
| Lifeline     | <b>13 11 14</b> (24 hours)<br><b><a href="http://www.lifeline.org.au">www.lifeline.org.au</a></b><br>Anyone can call Lifeline. The 13 11 14 service offers a counselling service that respects everyone's right to be heard, understood and cared for. We also provide information about other support services that are available in communities around Australia. |
| Mensline     | <b>1300 789 978</b> (24 hours)<br><b><a href="http://www.menslineaus.org.au">www.menslineaus.org.au</a></b><br>Mensline Australia is a dedicated service for men with relationship and family concerns.   |

| Organisation                        | Contact  |
|-------------------------------------|--|
| Kids Help Line                      | <p><b>1800 551 800</b> (24 hours)</p> <p><b><a href="http://www.kidshelpline.com.au">www.kidshelpline.com.au</a></b></p> <p>Kids Help Line is Australia's only free, confidential and anonymous, telephone and online counselling service specifically for young people aged between 5 and 25.</p>   |
| BeyondBlue                          | <p><b>1300 224 636</b></p> <p><b><a href="http://www.beyondblue.org.au">www.beyondblue.org.au</a></b></p> <p><i>BeyondBlue</i> is an independent, not-for-profit organisation working to increase awareness and understanding of depression, anxiety and related substance-use disorders throughout Australia and reduce the associated stigma</p>   |
| Centrelink                          | <p><i>1800 050 585 (Farm Assistance)</i></p> <p><i>13 23 16 (Drought Assistance Hotline)</i></p> <p><b><a href="http://www.centrelink.gov.au">www.centrelink.gov.au</a></b></p> <p>The Exceptional Circumstances Relief Payment (ECRP) is delivered by Centrelink on behalf of the Department of Agriculture, Fisheries and Forestry. The payment provides assistance to farmers living in 'exceptional circumstances' affected areas who are having difficulty meeting family and personal living expenses.</p>   |
| Rural Financial Counselling Service | <p><b>1800 686 175</b> (free call for referral to your nearest Rural Financial Counselling Service provider)</p> <p><b><a href="http://www.daff.gov.au/agriculture-food/drought/rfcs">www.daff.gov.au/agriculture-food/drought/rfcs</a></b></p> <p>Rural financial counsellors can:</p> <ul style="list-style-type: none"> <li>• help clients identify financial and business options</li> <li>• help clients negotiate with their lenders</li> <li>• help clients adjust to climate change through the Climate Change Adjustment Program, identify any advice and training needed and develop an action plan</li> <li>• help clients meet their mutual obligations under the Transitional Income Support program</li> <li>• give clients information about government and other assistance schemes</li> <li>• refer clients to accountants, agricultural advisers and educational services</li> <li>• refer clients to Centrelink and to professionals for succession planning, family mediation and personal, emotional and social counselling.</li> </ul> |

## Industry communication

In the event of a viticulture pest incursion, the Winemakers Federation of Australia will be the key industry contact and will have responsibility for industry communication and media relations. Other key viticulture industry associations will be informed of the incident through the national industry body.

Close cooperation is required between relevant government bodies and industry in regards to the effective management of a pest response and media/communication issues. Readers should refer to PLANTPLAN for further information.

Regional or state based industry organisations will be informed of the incident through the national industry contact.

**Table 13.** *Key viticulture industry contacts*

| Organisation                       | Position                                       | Name             | Address  | Contact details                                     |
|------------------------------------|--|------------------|--|---|
| Winemakers Federation of Australia | Director, International and Regulatory Affairs | Tony Battaglene  | Level 1<br>24 Bougainville Street<br>Manuka ACT 2603 | (02) 6239 8300<br><b>tbattaglene@ozemail.com.au</b> |
| Winemakers Federation of Australia | Chief Executive                                | Stephen Strachan | PO Box 2414<br>Kent Town SA 5071                     | (08) 8222 9255<br><b>ceo@wfa.org.au</b>             |
| Wine Grape Growers of Australia    | Executive Director                             | Mark McKenzie    |  | (08) 8331 1422<br><b>mark@wgga.com.au</b>           |
| Australian Table Grape Association | Chief Executive Officer                        | Jeff Scott       | 31 Deakin Avenue<br>Mildura VIC 3500                 | (03) 5021 5718<br><b>atgainc@ncable.com.au</b>      |
| Australian Dried Fruit Association | Chairman                                       | Peter Jones      | PO Box 5042<br>Mildura VIC 3502                      | (03) 5023 5174<br><b>jones_pj4@hotmail.com</b>      |

| Organisation   | Position                     | Name           | Address                              | Contact details                                     |
|--|------------------------------|----------------|--------------------------------------|---|
| Australian Dried Fruit Association                     | General Manager              | Phil Chidgzey  | PO Box 5042<br>Mildura VIC 3502      | (03) 5023 5174<br><b>pchidgzey@adfa.asn.au</b>      |
| Australian Dried Fruit Association                     | Industry Development Officer | John Hawtin    | PO Box 5042<br>Mildura VIC 3502      | (03) 5023 5174<br><b>jhawtin@adfa.asn.au</b>        |
| Vine Industry Nursery Association                      | Chairman                     | Paul Wright    | PO Box 180<br>Mount Pleasant SA 5235 | (08) 8568 2385<br><b>plwright@vinewright.com.au</b> |
| Vine Industry Nursery Association                      | Secretary                    | Andrew Gordon  | PO Box 1054<br>Mildura VIC 3502      | (03) 5025 8812<br><b>andy.kc@bigpond.com</b>        |
| Phylloxera and Grape Industry Board of South Australia | Chief Executive Officer      | Alan Nankivell | 46 nelson St<br>Stepney SA 5069      | (03) 8362 0488<br><b>www.phylloxera.com.au</b>      |

## Pest-specific emergency response and information documents

As part of the implementation of the IBP, pest-specific information and emergency response documents, such as fact sheets, contingency plans, pest risk reviews and diagnostic protocols, should be developed over time for all medium to high risk pests listed in the Threat Summary Tables (Appendix 1). Currently, a number of these documents have been developed for pests of the viticulture industry (Table 14) and are available for download from [www.planthealthaustralia.com.au/pidd](http://www.planthealthaustralia.com.au/pidd).

**Table 14.** Pest-specific information documents for the viticulture industry<sup>13</sup>

| Common name                | Scientific name                         | Fact sheet | Pest risk review | Diagnostic protocol |
|----------------------------|---|------------|------------------|---------------------|
| Orange tortrix             | <i>Argyrotaenia citrana</i>             | ✓          | ✓                |                     |
| Bois noir                  | Bois noir phytoplasma                   |            | ✓                |                     |
| Grape phylloxera           | <i>Daktulosphaira vitifoliae</i>        |            | ✓ <sup>14</sup>  |                     |
| Conspire stink bug         | <i>Euschistus conspersus</i>            |            | ✓                |                     |
| Flavescence dorée          | Grapevine flavescence dorée phytoplasma |            | ✓                |                     |
| Black rot                  | <i>Guignardia bidwellii</i>             |            | ✓                |                     |
| Glassy-winged sharpshooter | <i>Homalodisca coagulata</i>            |            | ✓                | ✓ <sup>15</sup>     |
| Angular leaf spot          | <i>Mycosphaerella angulata</i>          | ✓          | ✓                |                     |
| Texas root rot             | <i>Phymatotrichum omnivora</i>          | ✓          | ✓                |                     |
| Vine mealybug              | <i>Planococcus ficus</i>                | ✓          | ✓                |                     |
| Omnivorous leafroller      | <i>Platynota stultana</i>               | ✓          | ✓                |                     |
| Grape mealybug             | <i>Pseudococcus maritimus</i>           |            | ✓                |                     |
| Angular leaf scorch        | <i>Pseudopezicula tetraspora</i>        | ✓          | ✓                |                     |
| Rotbrenner                 | <i>Pseudopezicula tracheiphila</i>      |            | ✓                |                     |
| Bacterial blight           | <i>Xanthomonas ampelina</i>             |            | ✓                |                     |
| Pierce's disease           | <i>Xylella fastidiosa</i>               |            | ✓                | ✓ <sup>15,16</sup>  |

<sup>13</sup> Copies of these documents are available from [www.planthealthaustralia.com.au/biosecurity/viticulture](http://www.planthealthaustralia.com.au/biosecurity/viticulture)

<sup>14</sup> The grape phylloxera document is a National Management Protocol (draft) developed by the National Phylloxera Technical Reference Group on behalf of the National Vine Health Steering Committee (see page 47 for full details)

<sup>15</sup> Not nationally endorsed by the Sub-Committee for Plant Health Diagnostic Standards

<sup>16</sup> Document currently in draft form



## Threat-specific contingency plans

Over time, threat-specific contingency plans will be completed for the exotic threats identified in the viticulture plant pest priority list (Table 5). Updated plans will be identified during reviews of the biosecurity plan and added to the PHA website as they become available.

The guideline for development of threat-specific contingency plans, prepared by Dr Peter Merriman and Dr Simon McKirdy will be used as a basis for developing these plans<sup>17</sup>.

## National diagnostic standards for priority plant pest threats

PHA has commissioned a number of diagnostic standards that would be used to identify an exotic/emergency plant pest. These protocols would be used nationally in the event of an incursion, thus ensuring a rapid response and nationally consistent test results that are directly comparable.

Currently, a system is being set up so that these protocols are formally nationally endorsed, through the Subcommittee on Plant Health Diagnostic Standards (SPHDS).

## References

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Plant Health Australia (2008) *PLANTPLAN: Australian Emergency Plant Pest Response Plan*. Version 1. Plant Health Australia, Canberra, ACT.

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<sup>17</sup> Available from [www.planthealthaustralia.com.au/biosecurity](http://www.planthealthaustralia.com.au/biosecurity)

# **AWARENESS MATERIAL**

## Priority pests

The high priority emergency plant pests of the viticulture industry (Table 5) have been identified by members of the industry, government agencies and relevant research bodies. They have been assessed as having a high entry and/or high impact potential. This list should provide the basis for the development of awareness material.

## Fact sheets

In addition to those listed in (Table 14), fact sheets on pests of the viticulture industry are available from a range of government departments and other sources (Table 15).

**Table 15.** Fact sheets available for viticulture industry exotic pests

| Exotic threat  | Fact sheet available from  |
|--|--|
| <b>Angular leaf scorch</b><br><i>Pseudopezizicola tetraspora</i>           | Cornell University ( <a href="http://nysipm.cornell.edu/factsheets/grapes/">nysipm.cornell.edu/factsheets/grapes/</a> )  |
| <b>Bacterial blight</b><br><i>Xanthomonas ampelina</i>                     | DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )   |
| <b>Black rot</b><br><i>Guignardia bidwellii</i>                            | BSG ( <a href="http://www.daff.gov.au/ba">www.daff.gov.au/ba</a> )<br>Cornell University ( <a href="http://nysipm.cornell.edu/factsheets/grapes/">nysipm.cornell.edu/factsheets/grapes/</a> )<br>DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )<br>PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )                  |
| <b>Conspire stink bug</b><br><i>Euschistus conspersus</i>                  | University of California ( <a href="http://www.ipm.ucdavis.edu">www.ipm.ucdavis.edu</a> )<br>Washington State university ( <a href="http://entomology.tfrec.wsu.edu">entomology.tfrec.wsu.edu</a> )  |
| <b>Flavescence dorée</b><br><i>Grapevine flavescence dorée phytoplasma</i> | Department for Environment Food and Rural Affairs, UK ( <a href="http://www.defra.gov.uk">www.defra.gov.uk</a> )<br>Government of British Columbia ( <a href="http://www.agf.gov.bc.ca">www.agf.gov.bc.ca</a> )<br>Michigan State University ( <a href="http://www.grapes.msu.edu">www.grapes.msu.edu</a> )  |
| <b>Glassy winged sharpshooter</b><br><i>Homalodisca coagulata</i>          | DAFF ( <a href="http://www.daff.gov.au">www.daff.gov.au</a> )<br>DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )<br>NSW DII ( <a href="http://www.dpi.nsw.gov.au">www.dpi.nsw.gov.au</a> )<br>PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )<br>QPIF ( <a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a> ) |
| <b>Grape mealybug</b><br><i>Pseudococcus maritimus</i>                     | OARDC ( <a href="http://www.oardc.ohio-state.edu">www.oardc.ohio-state.edu</a> )<br>Virginia Tech ( <a href="http://www.viginiafruit.ento.vt.edu">www.viginiafruit.ento.vt.edu</a> )   |

| Exotic threat   | Fact sheet available from  |
|---|--|
| <b>Grape phylloxera</b><br><i>Daktulosphaira vitifoliae</i> | DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )<br>NSW DII ( <a href="http://www.dpi.nsw.gov.au">www.dpi.nsw.gov.au</a> )<br>PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )<br>PGIBSA ( <a href="http://www.phylloxera.com.au">www.phylloxera.com.au</a> )<br>QPIF ( <a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a> )<br>UC Davis<br>( <a href="http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html">www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html</a> ) |
| <b>Grapevine leaf rust</b><br><i>Phakospora euvitis</i>     | PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )<br>QPIF ( <a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a> )  |
| <b>Omnivorous leafroller</b><br><i>Platynota stultana</i>   | UC Davis<br>( <a href="http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html">www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html</a> )   |
| <b>Orange tortrix</b><br><i>Argyrotaenia citrana</i>        | PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )<br>UC Davis<br>( <a href="http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html">www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html</a> )   |
| <b>Pierce's disease</b><br><i>Xylella fastidiosa</i>        | DAFF ( <a href="http://www.daff.gov.au">www.daff.gov.au</a> )<br>DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )<br>PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )<br>PGIBSA ( <a href="http://www.phylloxera.com.au">www.phylloxera.com.au</a> )<br>QPIF ( <a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a> )<br>UC Davis<br>( <a href="http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html">www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html</a> )          |
| <b>Rotbrenner</b><br><i>Pseudopezicula tracheiphila</i>     | INRA ( <a href="http://www.inra.fr/hyp3">www.inra.fr/hyp3</a> )  |
| <b>Texas root rot</b><br><i>Phymatotrichum omnivorum</i>    | PaDIL ( <a href="http://www.padil.gov.au">www.padil.gov.au</a> )   |
| <b>Vine mealybug</b><br><i>Planococcus ficus</i>            | UC Davis<br>( <a href="http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html">www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html</a> )   |

## Grape pests under active control

**Table 16.** Pests under active control within Australia

| Pest name  | Information available from   |
|--|--|
| <b>Grape phylloxera</b><br><i>Daktulosphaira vitifoliae</i>  | DAFWA ( <a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a> )<br>DPI Vic ( <a href="http://www.dpi.vic.gov.au">www.dpi.vic.gov.au</a> )<br>NSW DII ( <a href="http://www.dpi.nsw.gov.au">www.dpi.nsw.gov.au</a> )<br>PGIBSA ( <a href="http://www.phylloxera.com.au">www.phylloxera.com.au</a> )<br>QPIF ( <a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a> ) |
| <b>Fruit fly (Queensland and Mediterranean)</b><br><i>Bactrocera tryoni</i> (Q-fly)<br><i>Ceratitis capitata</i> (Med-fly) | NSW DII ( <a href="http://www.dpi.nsw.gov.au">www.dpi.nsw.gov.au</a> )<br>PIRSA ( <a href="http://www.pir.sa.gov.au">www.pir.sa.gov.au</a> )<br>Tri-state Fruit Fly Program ( <a href="http://www.fruitfly.net.au">www.fruitfly.net.au</a> )<br>Vic DPI ( <a href="http://www.dpi.vic.gov.au">www.dpi.vic.gov.au</a> )   |

## General biosecurity awareness materials

**Table 17.** General biosecurity awareness material related to the viticulture industry

| Title  | Available from |
|--|----------------|
| <b>General biosecurity awareness material</b>  | <b>PGIBSA</b>  |
| <b>Code of Environmental Best Practice for Viticulture – Sunraysia Region</b><br>Contains useful information on vineyard biosecurity   | DPI Victoria   |
| <b>Biosecurity for small landholders</b>   | DAFWA          |
| <b>Regional biosecurity protocols for winegrape growers in greater Victoria</b>  | DPI Victoria   |
| <b>Vital information brochure series – itinerant farm workers</b><br>( <a href="http://www.daff.gov.au/__data/assets/pdf_file/0011/858746/itinerant-workers.pdf">www.daff.gov.au/__data/assets/pdf_file/0011/858746/itinerant-workers.pdf</a> )              | DAFF           |
| <b>Vital information brochure series – plant producers</b><br>( <a href="http://www.daff.gov.au/__data/assets/pdf_file/0010/813646/producers-itinerant-workers.pdf">www.daff.gov.au/__data/assets/pdf_file/0010/813646/producers-itinerant-workers.pdf</a> ) | DAFF           |
| <b>Vital information brochure series – don't put this farm at risk</b><br>( <a href="http://www.daff.gov.au/__data/assets/pdf_file/0007/1085191/plant-worker-poster.pdf">www.daff.gov.au/__data/assets/pdf_file/0007/1085191/plant-worker-poster.pdf</a> )   | DAFF           |

## Contacts for further information on viticulture industry biosecurity

A range of government and grower organisation details are provided below (Table 18) for persons seeking further information on viticulture industries and biosecurity.

**Table 18.** *Relevant sources of further biosecurity information for the viticulture industry*

| Agency  | Information   | Address  |
|---|---|--|
| <b>National</b>   |   |  |
| Winemakers Federation of Australia (WFA)<br><b>www.wfa.org.au</b>   | The Winemakers' Federation of Australia Incorporated (WFA) is the national peak body with voluntary membership representing more than 95% of the wine produced in Australia.<br><br>Refer to web site for information on the wine industry. | National Wine Centre<br>Botanic Road<br>PO Box 2414<br>Kent Town SA 5071<br>Telephone: (08) 8222 9255<br>Facsimile: (08) 8222 9250<br>Email: <b>wfa@wfa.org.au</b> |
| Wine Grape Growers Australia (WGGA)<br><b>www.wgga.com.au</b>       | Wine Grape Growers' Australia is the peak industry body for Australia's winegrape growers.  | PO Box 950<br>Kent Town SA 5071<br>Telephone: (08) 8331 1422<br>Fax: (08) 8331 1477<br>Email: <b>info@wgga.com.au</b>  |
| Australian Table Grape Association (ATGA)<br><b>www.atga.com.au</b> | The Australian Table Grape Association Inc (ATGA) is the peak industry body representing commercial table grape growers from across the country.  | 31 Deakin Avenue<br>Mildura VIC 3500<br>Telephone: (03) 5021 5718<br>Email: <b>info@atga.com.au</b>  |

| Agency   | Information   | Address   |
|--|---|---|
| Australian Dried Fruits Association (ADFA)<br><b>www.adfa.asn.au</b>                   | The ADFA is the peak body in the dried fruits industry and is an agri-political organisation that represents the interests of its grower members and provides services and initiatives of commercial benefit. ADFA is a voluntary organisation that is funded largely by growers.   | PO Box 5042<br>Mildura VIC 3502<br>Telephone: (03) 5023 5174<br>Fax: (03) 5023 3321   |
| Grape and Wine Research and Development Corporation (GWRDC)<br><b>www.gwrdc.com.au</b> | The Grape and Wine Research and Development Corporation (GWRDC) is the body responsible for investing in grape and wine research and development on behalf of the Australian wine industry and the Australian community.<br><br>Refer to their website for more information on research projects.   | PO Box 221<br>Goodwood, SA 5034<br>Telephone: (08) 8273 0500<br>Facsimile: (08) 8373 6608<br>Email: <b>gwrdc@gwrdc.com.au</b>             |
| Vine Industry Nursery Association (VINA)<br><b>www.vina.net.au</b>                     | VINA represents and promotes the interests of vine nurseries in matters of general interest that may affect their well being and viability. They also coordinate the efforts of vine nurseries in order to give unity of purpose and strength in the best interests of vine nursery development and provide a channel for communication and dissemination of information between vine nursery operators and with other sectors of the grape and wine industry | PO Box 1054<br>Mildura VIC 3502<br>Telephone: (03) 5025 8812  |
| National Wine and Grape Industry Centre (NWGIC)<br><b>www.csu.edu.au/nwgic</b>         | The National Wine & Grape Industry Centre (NWGIC) is a unique centre, combining research, extension, education and training for the wine industry.  | National Wine & Grape Industry Centre<br>Locked Bag 588<br>Wagga Wagga NSW 2678<br>Telephone: (02) 6933 2940<br>Facsimile: (02) 6933 4068 |
| Australian Wine Research Institute (AWRI)<br><b>www.awri.com.au</b>                    | The Australian Wine Research Institute, established in 1955, aims to advance the competitive edge of the Australian wine and grape industry through the delivery of world class research, development, extension and service activities.  | PO Box 197<br>Glen Osmond SA 5064<br>Telephone: (08) 8303 6600<br>Fax: (08) 8303 6601   |

| Agency  | Information  | Address  |
|---|--|--|
| Australian Quarantine and Inspection Service (AQIS)<br><b>www.aqis.gov.au</b>                     | Refer to the website for: <ul style="list-style-type: none"> <li>fact sheets on quarantine pests</li> <li>ICON – import conditions database</li> <li>PHYTO - plant and plant product export conditions database</li> </ul>   |  |
| Australian Government Department of Agriculture, Fisheries and Forestry<br><b>www.daff.gov.au</b> | Refer to the website for: <ul style="list-style-type: none"> <li>emergency plant pest incursion alerts</li> </ul>  | GPO Box 858<br>Canberra ACT 2601<br>Telephone: (02) 6272 3933  |
| Plant Health Australia<br><b>www.planthealthaustralia.com.au</b>                                  | Refer to web site for: <ul style="list-style-type: none"> <li>further information on Industry Biosecurity Plans</li> <li>other information on plant biosecurity projects</li> <li>pest fact sheets, pest risk reviews and contingency plans</li> <li>the Australian Plant Pest Database</li> </ul> | Suite 5, FECCA House<br>4 Phipps Close<br>Deakin ACT 2600<br>Telephone: (02) 6215 7700<br>Fax: (02) 6260 4321<br>Email: <b>admin@phau.com.au</b>   |
| <b>New South Wales</b>  |  |  |
| NSW Department of Industry and Investment<br><b>www.dpi.nsw.gov.au</b>                            | Refer to web site for information including: <ul style="list-style-type: none"> <li>pest and disease Agnotes and Agfacts</li> </ul>  | Agricultural Inspection Services<br>Sydney Markets Office<br>Shop 1 Markets Plaza, Sydney Markets<br>PO Box 1<br>Sydney Markets NSW 2129<br>Telephone: (02) 9735 9600<br>Fax: (02) 9735 9630 |



| Agency  | Information   | Address  |
|---|---|--|
| <b>Queensland</b>   |   |  |
| Biosecurity Queensland, part of the Department of<br>Employment, Economic Development and Innovation<br><b><a href="http://www.dpi.qld.gov.au">www.dpi.qld.gov.au</a></b>         | Refer to the QPIF web site for: <ul style="list-style-type: none"> <li>• pest fact sheets</li> <li>• crop production information</li> <li>• interstate market access information</li> </ul> | To report suspected exotic plant pests call<br>13 25 23.<br>For further information on interstate<br>quarantine and pests currently under official<br>control contact:<br>Biosecurity Queensland<br>3 <sup>rd</sup> Floor, Primary Industries Building<br>80 Ann Street<br>Brisbane QLD 4000<br>Telephone: 13 25 23<br>Fax: (07) 3404 6900<br>Email: <b><a href="mailto:callweb@dpi.qld.gov.au">callweb@dpi.qld.gov.au</a></b> |
| <b>Northern Territory</b>   |   |  |
| Department of Regional Development, Primary Industry,<br>Fisheries and Resources<br><b><a href="http://www.nt.gov.au/d/Primary_Industry">www.nt.gov.au/d/Primary_Industry</a></b> | Refer to the website for: <ul style="list-style-type: none"> <li>• information on field crops</li> <li>• pests and diseases</li> </ul>  | Head Office: Berrimah Farm<br>Makagon Road<br>Berrimah<br>Northern Territory 0828<br>Postal address: GPO BOX 3000<br>Darwin NT 0801<br>Telephone: (08) 8999 5511   |

| Agency   | Information  | Address  |
|--|--|--|
| <b>South Australia</b>   |  |  |
| Primary Industries and Resources<br><b>www.pir.sa.gov.au</b>                           |  | For further information on interstate quarantine and pests currently under official control, contact:<br>Plant Health Operations<br>46 Prospect Road<br>PROSPECT SA 5082<br>Telephone: 1300 666 010<br>Fax: (08) 8344 6033 |
| South Australian Research and Development Institute<br><b>www.sardi.sa.gov.au</b>      | South Australia Research and Development Institute is part of PIRSA. Refer to web site for fact sheets, and information on biosecurity issues including: <ul style="list-style-type: none"> <li>• farm hygiene</li> <li>• pest and disease management</li> </ul>   |  |
| Phylloxera and Grape Industry Board of South Australia<br><b>www.phylloxera.com.au</b> | The new Phylloxera and Grape Industry Board was appointed under the Phylloxera and Grape Industry Act in 1995. The board has a strong focus on awareness and prevention of phylloxera.<br>Refer to the website for: <ul style="list-style-type: none"> <li>• state protocols for prevention of phylloxera</li> </ul> |  |
| <b>Tasmania</b>  |  |  |
| Department of Primary Industries and Water<br><b>www.dpiw.tas.gov.au</b>               | Refer to website for: <ul style="list-style-type: none"> <li>• quarantine restrictions on movement of produce</li> <li>• information for growers</li> </ul>  | Department of Primary Industries and Water<br>GPO Box 44,<br>HOBART TAS 7001<br>Telephone: 1300 368 550 or (03) 6233 8011  |

| Agency   | Information  | Address  |
|--|--|--|
| <b>Victoria</b>  |  |  |
| Victorian Department of Primary Industries<br><b>www.dpi.vic.gov.au</b>            | Refer to web site for: <ul style="list-style-type: none"> <li>• pest fact sheets</li> <li>• information notes</li> <li>• interstate quarantine</li> </ul>      | For more details contact the DPI Plant Standards Branch on (freecall) 1800 084 881 or email on <b>plant.standards@dpi.vic.gov.au</b>   |
| <b>Western Australia</b>   |  |  |
| Department of Agriculture and Food Western Australia<br><b>www.agric.wa.gov.au</b> | Refer to web site for: <ul style="list-style-type: none"> <li>• pest fact sheets</li> <li>• farm biosecurity</li> <li>• pest and disease management</li> </ul> | For further information on interstate quarantine and pests currently under official control, contact:<br>Department of Agriculture and Food, Western Australia<br>Western Australian Quarantine and Inspection Service<br>9 Fricker Rd (cnr Horrie Miller Dr)<br>Perth Airport WA 6105<br>Telephone: (08) 9334 1800<br>Fax: (08) 9334 1888 |

# **APPENDIX 1: THREAT SUMMARY TABLES**

# Threat summary tables

## Invertebrates

The information provided in the threat summary tables (invertebrates, Table 19 and pathogens, Table 20) is a basic overview of plant pest threats to the viticulture industry. Summarised information on entry, establishment and spread potentials and economic consequences of establishment are provided where available. Assessments may change given more detailed research, and will be reviewed with the biosecurity plan.

**Table 19.** Viticulture industry invertebrate threat summary table

| Common name                        | Life form | Scientific name              | Primary host | Plant part affected             | Entry potential      | Establishment potential | Spread potential | Economic impact      | Overall risk |
|------------------------------------|-----------|------------------------------|--------------|---------------------------------|----------------------|-------------------------|------------------|----------------------|--------------|
| Vine leafhopper                    | Bug       | <i>Acia lineatifrons</i>     | Polyphagous  | Foliage, fruit                  | MEDIUM               | MEDIUM                  | MEDIUM           | MEDIUM <sup>18</sup> | LOW          |
| Chinese rose beetle                | Btle      | <i>Adoretus sinicus</i>      | Polyphagous  | Leaves                          | LOW <sup>19</sup>    | NEGLIGIBLE              | LOW              | NEGLIGIBLE           | NEGLIGIBLE   |
| Striped click beetle (wireworm)    | Btle      | <i>Agriotes lineatus</i>     | Polyphagous  | Leaves (adults), roots (larvae) | LOW <sup>20</sup>    | MEDIUM-HIGH             | MEDIUM           | MEDIUM <sup>21</sup> | LOW          |
| Turnip moth (Bark feeding cutworm) | Lep       | <i>Agrotis segetum</i>       | Polyphagous  | Roots, lower stems              | MEDIUM <sup>22</sup> | MEDIUM-HIGH             | HIGH             | MEDIUM <sup>23</sup> | LOW-MEDIUM   |
| Citrus black fly <sup>24</sup>     | Bug       | <i>Aleurocanthus woglumi</i> | Citrus       | Leaves, stems                   | LOW <sup>25</sup>    |                         |                  |                      |              |

<sup>18</sup> Possible virus vector

<sup>19</sup> Unlikely to enter due to large size

<sup>20</sup> Unlikely to enter due to large size

<sup>21</sup> Very destructive to young grapes

<sup>22</sup> Potential risk of transporting with plant and soil material

<sup>23</sup> Stand reducer

<sup>24</sup> Also known as blue grey fly or citrus spring white fly

| Common name  | Life form | Scientific name               | Primary host                              | Plant part affected   | Entry potential   | Establishment potential | Spread potential   | Economic impact          | Overall risk    |
|--|-----------|-------------------------------|---|---|-------------------|-------------------------|--------------------|--------------------------|-----------------|
| Flea beetle  | Btle      | <i>Altica ampelophaga</i>     | Grapevine                                 | Foliage   | LOW               | MEDIUM                  | MEDIUM             | MEDIUM                   | LOW             |
| Grape flea beetle                                  | Btle      | <i>Altica chalybea</i>        | Polyphagous                               | Foliage (larvae), leaf buds   | LOW               | MEDIUM                  | MEDIUM             | MEDIUM                   | LOW             |
| Grape vine flea beetle (leaf beetle)               | Btle      | <i>Altica torquata</i>        | Polyphagous                               | Buds  | LOW               | MEDIUM                  | MEDIUM             | MEDIUM                   | LOW             |
| Spotted cutworm                                    | Lep       | <i>Amathes c-nigrum</i>       | Grapevine                                 | Whole plant, leaves, stems, growing points, flowers, fruit, and seeds | HIGH              | MEDIUM-HIGH             | MEDIUM-HIGH        | LOW-MEDIUM <sup>26</sup> | VERY LOW-MEDIUM |
| Arizona grape bruchid                              | Btle      | <i>Amblycerus vitus</i>       | Canyon grape                              | Fruit   | LOW               | LOW                     | LOW                | LOW                      | NEGLECTIBLE     |
| Grape cane girdler                                 | Btle      | <i>Ampelogypter ater</i>      | Grapevine                                 | Shoots, canes   | LOW               | MEDIUM                  | MEDIUM             | MEDIUM                   | LOW             |
| Grape cane gallmaker                               | Btle      | <i>Ampelogypter sesostris</i> | Grapevine                                 | Cane, nodes on fruit clusters   | LOW               | MEDIUM                  | MEDIUM             | MEDIUM                   | LOW             |
| Hawkmoth   | Lep       | <i>Ampelophaga rubiginosa</i> | <i>Vitis vinifera</i>                     | Whole plant   | MEDIUM            | HIGH                    | HIGH               | LOW-MEDIUM <sup>27</sup> | LOW-MEDIUM      |
| Orange navel worm                                  | Lep       | <i>Amyelois transitella</i>   | Citrus, almond, pistachio, vitis vinifera | Damaged, overripe and dried fruit and nuts                            | LOW <sup>28</sup> | MEDIUM <sup>29</sup>    | HIGH <sup>30</sup> | MEDIUM <sup>31</sup>     | LOW             |
| Oriental beetle (Japanese scarab, Cupreous chafer) | Btle      | <i>Anomala cuprea</i>         | Beans, groundnut, sweet potato, grapevine | Leaves  | MEDIUM            | MEDIUM                  | MEDIUM             | LOW                      | VERY LOW        |
| Aphid  | Bug       | <i>Aphis citricola</i>        | Polyphagous                               |   | LOW <sup>32</sup> |                         |                    |                          |                 |

<sup>25</sup> Not on pathway

<sup>26</sup> Considered a minor agricultural pest, but can develop into a major local infestation on a wide variety of crops

<sup>27</sup> An occasional pest of cultivated grapevines, but it can defoliate entire plantations

<sup>28</sup> Larvae are most often present in fruit which would not be packed due to quality issues

<sup>29</sup> If hosts are available

<sup>30</sup> Adults are agile flyers, can travel distances of 375 -425m

<sup>31</sup> Can be an important pest of horticultural fruits and nuts, Serious economic pest of almonds and walnuts in USA

| Common name  | Life form | Scientific name                 | Primary host                            | Plant part affected                   | Entry potential             | Establishment potential   | Spread potential            | Economic impact                 | Overall risk           |
|--|-----------|---------------------------------|---|---------------------------------------|-----------------------------|---------------------------|-----------------------------|---------------------------------|------------------------|
| <b>Black bean aphid</b>                                      | Bug       | <i>Aphis fabae</i>              | Beetroot, common bean, broad bean       | Leaves, growing points, inflorescence | <b>MEDIUM</b> <sup>33</sup> | <b>MEDIUM-HIGH</b>        | <b>MEDIUM-HIGH</b>          | <b>LOW-MEDIUM</b> <sup>34</sup> | <b>VERY LOW-MEDIUM</b> |
| <b>Grape vine aphid</b>                                      | Bug       | <i>Aphis illinoisensis</i>      | Pawpaw, grapevine, mango                | Shoots, leaves, fruit                 | <b>LOW</b>                  | <b>LOW</b>                | <b>LOW</b>                  | <b>LOW</b>                      | <b>NEGLECTABLE</b>     |
| <b>Grape leafhopper</b>                                      | Bug       | <i>Arboridia adanae</i>         | Grapevine                               | Leaves, stem                          | <b>MEDIUM</b> <sup>35</sup> | <b>MEDIUM</b>             | <b>HIGH</b>                 | <b>MEDIUM</b>                   | <b>LOW</b>             |
| <b>Grape leafhopper</b>                                      | Bug       | <i>Arboridia apicalis</i>       | Apple, grapevine                        | Leaves, stem, fruit                   | <b>MEDIUM</b> <sup>36</sup> | <b>MEDIUM</b>             | <b>HIGH</b>                 | <b>MEDIUM</b>                   | <b>LOW</b>             |
| <b>Orange tortrix</b>  | Lep       | <i>Argyrotaenia citrana</i>     | Apple, blackberry, raspberry, grapevine | Buds, fruit, leaves, young shoots     | <b>MEDIUM</b> <sup>37</sup> | <b>HIGH</b> <sup>38</sup> | <b>MEDIUM</b> <sup>39</sup> | <b>MEDIUM</b> <sup>40</sup>     | <b>LOW</b>             |
| <b>Grape tortrix</b>   | Lep       | <i>Argyrotaenia ljungiana</i>   | Grapevine, apple, pear, cedar           | Fruit                                 | <b>MEDIUM</b>               | <b>MEDIUM</b>             | <b>MEDIUM</b>               | <b>LOW-MEDIUM</b>               | <b>VERY LOW-LOW</b>    |
| <b>Red banded leaf roller</b>                                | Lep       | <i>Argyrotaenia velutinana</i>  | Apple, cherry, grapevine                | Flowers, fruit                        | <b>MEDIUM</b>               | <b>MEDIUM</b>             | <b>MEDIUM</b>               | <b>LOW-MEDIUM</b>               | <b>VERY LOW-LOW</b>    |
| <b>Pustule scale, oleander pit scale, akee fringed scale</b> | Bug       | <i>Asterolecanium pustulans</i> | Polyphagous                             | Stems, branches                       | <b>UNKNOWN</b>              | <b>UNKNOWN</b>            | <b>UNKNOWN</b>              | <b>UNKNOWN</b>                  | <b>UNKNOWN</b>         |
| <b>Silver-Y moth</b>   | Lep       | <i>Autographa gamma</i>         | Polyphagous                             | Leaves, and growing points            | <b>MEDIUM</b>               | <b>MEDIUM</b>             | <b>MEDIUM</b>               | <b>LOW</b> <sup>41</sup>        | <b>VERY LOW</b>        |

<sup>32</sup> Not on pathway<sup>33</sup> Carried on young plant material<sup>34</sup> Economic impact mainly due to direct feeding damage<sup>35</sup> Eggs laid in stems and leaf veins<sup>36</sup> Eggs laid in stems<sup>37</sup> Feeds in fruit clusters but generally produces webbing which increases the chance of detection<sup>38</sup> Has a broad range of hosts and developmental temperatures<sup>39</sup> Adults fly (100-600m), young larvae can be transported short distances on silken strands by the wind<sup>40</sup> Fruit yield reduced by fruit drop caused by stem feeding and through direct feeding on fruit. Allows invasion of decay organisms causing fruit rot. Damage levels of up to 25%. Reduces yield and grape quality.<sup>41</sup> Damage foliage and larvae can feed on the contents of the fruit. A single larva could damage 20 or more mature grapes

| Common name                    | Life form | Scientific name                  | Primary host               | Plant part affected  | Entry potential          | Establishment potential | Spread potential     | Economic impact      | Overall risk |
|--------------------------------|-----------|----------------------------------|----------------------------|--|--------------------------|-------------------------|----------------------|----------------------|--------------|
| <b>Darkling ground beetle</b>  | Btle      | <i>Blapstinus</i> sp.            | Polyphagous                | Trunk, young tissue  | LOW                      | MEDIUM                  | MEDIUM               | MEDIUM               | LOW          |
| <b>Western grape root worm</b> | Btle      | <i>Bromius obscurus</i>          | Grapevine, fireweed, roses | Fruit, foliage (adult), roots (larvae)                               | MEDIUM                   | MEDIUM                  | MEDIUM               | MEDIUM               | LOW          |
| <b>Bean thrips</b>             | Thri      | <i>Caliothrips fasciatus</i>     | Polyphagous                | Buds, flowers, fruit, leaves   | LOW-MEDIUM <sup>42</sup> | MEDIUM <sup>43</sup>    | HIGH <sup>44</sup>   | MEDIUM <sup>45</sup> | LOW          |
| <b>Grape trunk borer</b>       | Btle      | <i>Cerasphorus albofasciatus</i> | Polyphagous                | Trunks, shoots   | LOW                      | MEDIUM                  | MEDIUM               | MEDIUM               | LOW          |
| <b>Natal fruit fly</b>         | Fly       | <i>Ceratitis rosa</i>            | Polyphagous                | Fruits   | LOW <sup>46</sup>        | HIGH <sup>47</sup>      | MEDIUM <sup>48</sup> | MEDIUM-HIGH          | LOW-MEDIUM   |
| <b>Buffalo treehopper</b>      | Bug       | <i>Ceresa alta</i>               | Polyphagous                | Leaves, stems  | LOW                      | MEDIUM                  | MEDIUM               | MEDIUM <sup>49</sup> | LOW          |
| <b>Periodical cicada</b>       | Bug       | <i>Cicada septemdecim</i>        | Polyphagous                | Stems (adults), branches (adults), grass (nymph), tree roots (nymph) | LOW                      | MEDIUM                  | LOW                  | LOW                  | NEGLIGIBLE   |
| <b>Green leafhopper</b>        | Bug       | <i>Cicadella viridis</i>         | Polyphagous                | Foliage  | LOW                      | MEDIUM                  | MEDIUM               | LOW <sup>50</sup>    | VERY LOW     |
| <b>Omnivorous leafroller</b>   | Lep       | <i>Cnephasia longana</i>         | Polyphagous                | Leaves, stems, growing points, fruit, inflorescence                  | UNKNOWN <sup>51</sup>    |                         |                      |                      |              |
| <b>Citrus planthopper</b>      | Bug       | <i>Colgar peracutum</i>          | <i>Citrus</i> spp.         | Leaves, branches, twigs  | LOW                      | MEDIUM                  | MEDIUM               | LOW                  | VERY LOW     |
| <b>Grape colaspis beetle</b>   | Btle      | <i>Collaspis brunnea</i>         | Polyphagous                | Roots  | LOW                      | MEDIUM                  | MEDIUM               | MEDIUM               | LOW          |

<sup>42</sup> Cannot feed on grape clusters but is a known hitchhiker

<sup>43</sup> Has a wide host range

<sup>44</sup> Disperses readily via wind currents. Prefers dry weather.

<sup>45</sup> Damage and crop losses caused to a wide variety of economically important plants

<sup>46</sup> Fruits and growing medium accompanying plants can harbour pest during transport

<sup>47</sup> Likely less tolerant of winter cold

<sup>48</sup> Adult flight and the transport of infested fruit are the major means of movement and dispersal

<sup>49</sup> Grapevines develop corky growths that strangle the vine beyond that point causing severe dieback. Damage most acute where legumes grown as an understory crop

<sup>50</sup> However, the green leafhopper is a pathogen vector

<sup>51</sup> Does not pose a phytosanitary risk



| Common name                              | Life form | Scientific name                  | Primary host   | Plant part affected                 | Entry potential              | Establishment potential     | Spread potential            | Economic impact             | Overall risk      |
|--|-----------|----------------------------------|--|-------------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------|
| <b>Grapeleaf bud mite</b>                | Mite      | <i>Colomerus vitis strain C</i>  | Grapevine  | Buds, leaves                        | <b>LOW</b> <sup>52</sup>     | <b>MEDIUM</b> <sup>53</sup> | <b>MEDIUM</b>               | <b>MEDIUM</b> <sup>54</sup> | <b>LOW</b>        |
| <b>Darkbrown beetle</b>                  | Btle      | <i>Coniontis parviceps</i>       | Polyphagous  | Buds, foliage                       | <b>LOW</b>                   | <b>MEDIUM</b>               | <b>LOW</b>                  | <b>LOW</b>                  | <b>VERY LOW</b>   |
| <b>Grape flower midges</b>               | Fly       | <i>Contarinia</i> sp.            | Polyphagous  | Blossoms, buds, fruit               | <b>MEDIUM</b> <sup>55</sup>  | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>LOW</b>        |
| <b>Green June beetle</b>                 | Btle      | <i>Cotinis nitida</i>            | Turfgrass, corn, oats, sorghum, alfalfa, vegetables, tobacco, grapevine, ornamentals | Fruit, roots                        | <b>MEDIUM</b>                | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>LOW</b>        |
| <b>Grape curculio</b>                    | Btle      | <i>Craponius inaequalis</i>      | Grapevine  | Leaves, fruit <sup>56</sup>         | <b>MEDIUM</b>                | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>MEDIUM</b>               | <b>LOW</b>        |
| <b>False codling moth</b>                | Lep       | <i>Cryptophlebia leucotreta</i>  | Polyphagous  | Leaves, fruits/pods, and seeds      | <b>UNKNOWN</b> <sup>57</sup> |                             |                             |                             |                   |
| <b>Brownheaded leafroller</b>            | Lep       | <i>Ctenopseustis obliquana</i>   | Apricot, apple, peach, blueberry grapevine   | Foliage, fruit, buds                | <b>MEDIUM-HIGH</b>           | <b>MEDIUM-HIGH</b>          | <b>MEDIUM-HIGH</b>          | <b>MEDIUM</b>               | <b>LOW-MEDIUM</b> |
| <b>Grape phylloxera (exotic strains)</b> | Bug       | <i>Daktulosphaira vitifoliae</i> | Grapevine  | Roots, leaves                       | <b>MEDIUM-HIGH</b>           | <b>HIGH</b>                 | <b>MEDIUM</b>               | <b>MEDIUM-HIGH</b>          | <b>LOW-HIGH</b>   |
| <b>Grape leafroller</b>                  | Lep       | <i>Desmia funeralis</i>          | Grapevine  | Fruit (severe infestations), leaves | <b>LOW</b> <sup>58</sup>     | <b>MEDIUM</b> <sup>59</sup> | <b>MEDIUM</b> <sup>60</sup> | <b>MEDIUM</b> <sup>61</sup> | <b>MEDIUM</b>     |

<sup>52</sup> Infests buds and leaves<sup>53</sup> Single primary host<sup>54</sup> Affects leaf growth<sup>55</sup> Eggs laid in fruit<sup>56</sup> Lays eggs in grape fruit. Has a three week life cycle<sup>57</sup> Transported with fruits and flowers<sup>58</sup> Larvae primarily feed on leaves. Larvae could survive during shipment and pupate on arrival.<sup>59</sup> Few alternate hosts, only one of which is established in Australia<sup>60</sup> Adults mobile through flight<sup>61</sup> Can cause up to 50% loss. Damage usually only occurs with massive, late season infestations

| Common name                                 | Life form | Scientific name                      | Primary host   | Plant part affected                      | Entry potential             | Establishment potential     | Spread potential                 | Economic impact              | Overall risk          |
|---|-----------|--------------------------------------|--|--|-----------------------------|-----------------------------|----------------------------------|------------------------------|-----------------------|
| <b>Grape scale</b>                          | Bug       | <i>Diaspidiotus uvae</i>             | Polyphagous  | Trunks, arms, canes, shoots              | <b>LOW-MEDIUM</b>           | <b>LOW-MEDIUM</b>           | <b>LOW-MEDIUM</b>                | <b>LOW-MEDIUM</b>            | <b>NEGLIGIBLE-LOW</b> |
| <b>Grape thrips (Eastern flower thrips)</b> | Thri      | <i>Drepanothrips reuteri</i>         | Wide range of horticultural crops, including grapevine | Fruit, leaves                            | <b>MEDIUM</b> <sup>62</sup> | <b>MEDIUM</b> <sup>63</sup> | <b>HIGH</b> <sup>64</sup>        | <b>MEDIUM</b> <sup>65</sup>  | <b>LOW</b>            |
| <b>Cotton leafhopper</b>                    | Bug       | <i>Empoasca decipiens</i>            | Polyphagous  | Leaves                                   | <b>LOW</b>                  | <b>MEDIUM</b>               | <b>MEDIUM</b>                    | <b>LOW</b>                   | <b>VERY LOW</b>       |
| <b>Potato leafhopper</b>                    | Bug       | <i>Empoasca fabae</i>                | Polyphagous  | Leaves                                   | <b>LOW-MEDIUM</b>           | <b>MEDIUM</b>               | <b>MEDIUM</b>                    | <b>LOW-MEDIUM</b>            | <b>VERY LOW-LOW</b>   |
| <b>Leafhopper</b>                           | Bug       | <i>Empoasca punjabensis</i>          | Polyphagous  | Foliage                                  | <b>LOW</b>                  | <b>MEDIUM</b>               | <b>HIGH</b>                      | <b>LOW</b>                   | <b>VERY LOW</b>       |
| <b>Small green leafhopper</b>               | Bug       | <i>Empoasca vitis</i>                | Polyphagous  | Leaves                                   | <b>LOW</b> <sup>66</sup>    |                             |                                  | <b>UNKNOWN</b> <sup>67</sup> |                       |
| <b>Grape berry moth</b>                     | Lep       | <i>Endopiza viteana</i>              | Grapevine  | Flowers, fruit                           |                             |                             |                                  |                              |                       |
| <b>Yellow vine mite</b>                     | Mite      | <i>Eotetranychus carpini vititis</i> | Chestnut, hazel, plum, grapevine                       | Fruit, leaves, old and young shoots      | <b>MEDIUM</b> <sup>68</sup> | <b>MEDIUM</b> <sup>69</sup> | <b>MEDIUM-HIGH</b> <sup>70</sup> | <b>HIGH</b>                  | <b>MEDIUM</b>         |
| <b>Willamette mite</b>                      | Mite      | <i>Eotetranychus willamettei</i>     | Polyphagous  | Fruit (under heavy infestations), leaves | <b>MEDIUM</b> <sup>71</sup> | <b>MEDIUM</b>               | <b>MEDIUM-HIGH</b> <sup>72</sup> | <b>LOW</b>                   | <b>LOW</b>            |
| <b>Grape sawfly</b>                         | Hym       | <i>Erythaspides vitis</i>            | Grapevine  | Foliage                                  | <b>LOW</b>                  | <b>MEDIUM</b>               | <b>MEDIUM</b>                    | <b>LOW</b>                   | <b>VERY LOW</b>       |

<sup>62</sup> Feed on young fruit and could be present on grape clusters

<sup>63</sup> Many horticultural crops are hosts

<sup>64</sup> Disperse readily via wind currents. Also capable of asexual reproduction if the host is present

<sup>65</sup> Significant pest on many horticultural crops, including grapes

<sup>66</sup> Possible transfer of eggs in leaf material

<sup>67</sup> Considered significant pest, but few assessments completed

<sup>68</sup> Mites may enter as hitchhikers. May be missed in inspection due to minute size

<sup>69</sup> Hosts widespread in southern Australia

<sup>70</sup> Short lifecycle. Transported in wind currents

<sup>71</sup> Mites may enter as hitchhikers. May be missed in inspection due to minute size

<sup>72</sup> Transported in wind currents

| Common name                          | Life form | Scientific name                | Primary host                     | Plant part affected | Entry potential            | Establishment potential    | Spread potential         | Economic impact         | Overall risk        |
|--------------------------------------|-----------|--------------------------------|----------------------------------|---------------------|----------------------------|----------------------------|--------------------------|-------------------------|---------------------|
| <b>Eastern grape leafhopper</b>      | Bug       | <i>Erythroneura calycula</i>   | Polyphagous                      | Leaves, foliage     | <b>LOW-MEDIUM</b>          | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Grape leafhopper</b>              | Bug       | <i>Erythroneura comes</i>      | Polyphagous, including grapevine | Foliage             | <b>LOW<sup>73</sup></b>    | <b>MEDIUM-HIGH</b>         | <b>MEDIUM-HIGH</b>       | <b>LOW-MEDIUM</b>       | <b>VERY LOW-LOW</b> |
| <b>Western grape leafhopper</b>      | Bug       | <i>Erythroneura elegantula</i> | Polyphagous                      | Leaves              | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Three banded grape leafhopper</b> | Bug       | <i>Erythroneura maculator</i>  | Polyphagous                      | Leaves              | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Three banded grape leafhopper</b> | Bug       | <i>Erythroneura tricincta</i>  | Polyphagous                      | Foliage             | <b>LOW<sup>74</sup></b>    | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Variegated grape leafhopper</b>   | Bug       | <i>Erythroneura variabilis</i> | Polyphagous                      | Foliage             | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Leafhopper</b>                    | Bug       | <i>Erythroneura vitifex</i>    | Grapevine                        | Leaves              | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Leafhopper</b>                    | Bug       | <i>Erythroneura vitis</i>      | Grapevine                        | Leaves              | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Leafhopper</b>                    | Bug       | <i>Erythroneura vulnerata</i>  | Polyphagous                      | Leaves              | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>MEDIUM</b>            | <b>MEDIUM</b>           | <b>LOW</b>          |
| <b>Leafhopper</b>                    | Bug       | <i>Erythroneura ziczac</i>     | Polyphagous                      | Foliage             | <b>LOW<sup>75</sup></b>    | <b>LOW</b>                 | <b>MEDIUM</b>            | <b>MEDIUM</b>           | <b>VERY LOW</b>     |
| <b>Salt marsh caterpillar</b>        | Lep       | <i>Estigmene acrea</i>         | Polyphagous                      | Fruit, leaves       | <b>MEDIUM<sup>76</sup></b> | <b>MEDIUM<sup>77</sup></b> | <b>HIGH<sup>78</sup></b> | <b>LOW<sup>79</sup></b> | <b>VERY LOW</b>     |
| <b>Grapevine looper</b>              | Lep       | <i>Eulithis diversilineata</i> | Grapevine, Virginia creeper      | Foliage             | <b>LOW</b>                 | <b>MEDIUM</b>              | <b>HIGH</b>              | <b>LOW</b>              | <b>VERY LOW</b>     |

<sup>73</sup> Eggs in leaves and foliage<sup>74</sup> Eggs in tissue<sup>75</sup> Eggs in tissue<sup>76</sup> Pupae may be present in bunches<sup>77</sup> Wide host range but relatively long life cycle which includes overwintering period<sup>78</sup> Adults are winged<sup>79</sup> Occasional pest of grapes

| Common name                            | Life form | Scientific name                | Primary host                         | Plant part affected                                  | Entry potential   | Establishment potential | Spread potential     | Economic impact    | Overall risk |
|--|-----------|--------------------------------|--------------------------------------|--|-------------------|-------------------------|----------------------|--------------------|--------------|
| <b>Achemon sphinx moth</b>             | Lep       | <i>Eumorpha achemon</i>        | Polyphagous                          | Foliage  | LOW               | MEDIUM                  | HIGH                 | HIGH               | MEDIUM       |
| <b>Conspere stink bug</b>              | Bug       | <i>Euschistus conspersus</i>   | Polyphagous                          | Fruit  | LOW               | LOW                     | HIGH                 | HIGH               | LOW          |
| <b>Darksided cutworm</b>               | Lep       | <i>Euxoa messoria</i>          | Polyphagous                          | Young plants (ground level and below), foliage, buds | MEDIUM            | MEDIUM                  | MEDIUM               | LOW                | VERY LOW     |
| <b>Grape root worm</b>                 | Btle      | <i>Fidia viticida</i>          | Red bud, Virginia creeper, grapevine | Roots, foliage                                       | LOW <sup>80</sup> | MEDIUM                  | MEDIUM               | MEDIUM             | LOW          |
| <b>Minute flower thrips</b>            | Thri      | <i>Frankliniella minuta</i>    | Asteraceae, grapevine                | Flowers, leaves, stems, buds                         | MEDIUM            | MEDIUM <sup>81</sup>    | MEDIUM <sup>82</sup> | LOW <sup>83</sup>  | VERY LOW     |
| <b>Eastern flower thrips</b>           | Thri      | <i>Frankliniella tritici</i>   | Polyphagous                          | Flowers  | MEDIUM            | HIGH                    | HIGH                 | LOW                | LOW          |
| <b>Grape bud beetle</b>                | Btle      | <i>Glyptoscelis squamulata</i> | Polyphagous, including grapevine     | Open buds, roots                                     | LOW               | MEDIUM                  | MEDIUM               | MEDIUM             | LOW          |
| <b>Western grape leaf skeletonizer</b> | Lep       | <i>Harrisina brillians</i>     | Grapevine, apricot, cherry, almonds  | Fruit, leaves  | LOW <sup>84</sup> | MEDIUM <sup>85</sup>    | MEDIUM <sup>86</sup> | HIGH <sup>87</sup> | HIGH         |
| <b>Tea mosquito bug</b>                | Bug       | <i>Helopeltis antonii</i>      | Tea, coffee, cashew                  | Leaves, stems, growing points, fruit, inflorescence  | LOW               | LOW                     | LOW                  | LOW                | NEGLIGIBLE   |

<sup>80</sup> Soil dwelling and not transported in fruit

<sup>81</sup> Limited host range

<sup>82</sup> Can be transported in wind currents

<sup>83</sup> Minor pest of grapes

<sup>84</sup> Larvae mostly colonise leaves

<sup>85</sup> In areas where host is present

<sup>86</sup> Adults have ability to fly and females can deposit a large number of eggs on potential hosts

<sup>87</sup> Serious defoliating pest

| Common name  | Life form | Scientific name  | Primary host                  | Plant part affected   | Entry potential            | Establishment potential  | Spread potential         | Economic impact                | Overall risk               |
|--|-----------|--|-------------------------------|---|----------------------------|--------------------------|--------------------------|--------------------------------|----------------------------|
| <b>Subterranean termite</b>  | Iso       | <i>Heterotermes aureus</i>   | Polyphagous                   | Heartwood, deadwood   | <b>HIGH</b>                | <b>HIGH</b>              | <b>MEDIUM</b>            | <b>HIGH</b>                    | <b>HIGH</b>                |
| <b>Vectors of Pierce's disease</b><br>(including glassy-winged sharpshooter, blue-green sharpshooter, green sharpshooter and the redheaded sharpshooter) | Bug       | <i>Homalodisca inifera</i> ,<br><i>Graphocephala atropunctata</i> ,<br><i>Draecula cephal</i><br><i>Minerva</i> ,<br><i>Carneiocephala fulgida</i> , <i>Acrogonia terminalis</i> ,<br><i>Dilobopterus costalimai</i> ,<br><i>Oncometopia fascilais</i> | Lemon, stone fruit, grapevine | Seedling stage, vegetative growing stage, flowering stage, and fruiting stage | <b>HIGH<sup>88</sup></b>   | <b>HIGH<sup>89</sup></b> | <b>HIGH<sup>90</sup></b> | <b>HIGH</b>                    | <b>HIGH</b>                |
| <b>American white moth (fall web worm)</b>   | Lep       | <i>Hyphantria cunea</i>  | Polyphagous                   | Leaves  | <b>LOW<sup>91</sup></b>    | <b>LOW-MEDIUM</b>        | <b>LOW-MEDIUM</b>        | <b>LOW-MEDIUM</b>              | <b>NEGLIGIBLE-LOW</b>      |
| <b>Western drywood termite</b>   | Iso       | <i>Incisitermes minor</i>  | Polyphagous                   | Heartwood, deadwood   | <b>HIGH</b>                | <b>HIGH</b>              | <b>MEDIUM</b>            | <b>HIGH</b>                    | <b>HIGH</b>                |
| <b>Leafhopper</b>  | Bug       | <i>Jacobiasca lybica</i>   | Polyphagous                   | Leaves, shoots  | <b>LOW-MEDIUM</b>          | <b>MEDIUM</b>            | <b>HIGH</b>              | <b>LOW</b>                     | <b>VERY LOW</b>            |
| <b>Grape tomato gall midge</b>   | Fly       | <i>Lasioptera vitis</i>  | Polyphagous                   | Foliage, fruit  | <b>MEDIUM<sup>92</sup></b> | <b>MEDIUM</b>            | <b>MEDIUM</b>            | <b>MEDIUM</b>                  | <b>LOW</b>                 |
| <b>European fruit lecanium scale</b>   | Bug       | <i>Lecanium corni</i>  | Polyphagous                   | Leaves, stems, growing points   | <b>MEDIUM<sup>93</sup></b> | <b>MEDIUM</b>            | <b>LOW</b>               | <b>LOW-MEDIUM<sup>94</sup></b> | <b>NEGLIGIBLE-VERY LOW</b> |

<sup>88</sup> Transported on leaves and stems<sup>89</sup> The greatest threats are to regions with mild winter host species are grown<sup>90</sup> The glassy-winged sharpshooter moves plant to plant, never exhibiting sustained flight. Rapid dispersal as eggs on plant material<sup>91</sup> Transported with plant material<sup>92</sup> Eggs laid in fruit<sup>93</sup> All life stages may be carried on plant material<sup>94</sup> Infestations result in reduced vigour and general debility of the host plant

| Common name                                  | Life form | Scientific name                  | Primary host                     | Plant part affected   | Entry potential      | Establishment potential | Spread potential | Economic impact          | Overall risk |
|--|-----------|----------------------------------|----------------------------------|---|----------------------|-------------------------|------------------|--------------------------|--------------|
| <b>Click beetle (Pacific coast wireworm)</b> | Btle      | <i>Limonius canus</i>            | Polyphagous                      | Buds  | LOW                  | MEDIUM                  | MEDIUM           | LOW                      | VERY LOW     |
| <b>Grape berry moth</b>                      | Lep       | <i>Lobesia botrana</i>           | Grapevine                        | Inflorescence, fruits                                       | MEDIUM <sup>95</sup> | MEDIUM                  | MEDIUM           | LOW-MEDIUM <sup>96</sup> | VERY LOW-LOW |
| <b>Rose chafer</b>                           | Btle      | <i>Macrodactylus subspinosus</i> | Polyphagous, including grapevine | Foliage , flowers, fruit                                    | MEDIUM               | MEDIUM                  | MEDIUM           | MEDIUM                   | LOW          |
| <b>Ground pearls</b>                         | Bug       | <i>Margarodes</i> (>6 species)   | Grapevine                        | Roots   | LOW-MEDIUM           | HIGH                    | LOW              | MEDIUM                   | VERY LOW-LOW |
| <b>Branch &amp; twig borer</b>               | Lep       | <i>Melalqus confertus</i>        | Polyphagous                      | Branches, buds, canes                                       | LOW                  | MEDIUM                  | MEDIUM           | MEDIUM                   | LOW          |
| <b>Devastating grasshopper</b>               | Locu      | <i>Melanoplus devastator</i>     | Polyphagous <sup>97</sup>        | Leaves, stems, growing points, fruits, seeds, inflorescence | LOW                  | MEDIUM                  | HIGH             | MEDIUM                   | LOW          |
| <b>Common European cockchafer</b>            | Btle      | <i>Melolontha melolontha</i>     | Polyphagous                      | Leaves, roots, fruit, inflorescence                         | MEDIUM               | MEDIUM                  | MEDIUM           | MEDIUM                   | LOW          |
| <b>Black beetle</b>                          | Btle      | <i>Metoponium abnorme</i>        | Polyphagous, including grapevine | Buds, foliage   | LOW                  | MEDIUM                  | MEDIUM           | LOW                      | VERY LOW     |
| <b>False chinch bug</b>                      | Bug       | <i>Nysius raphanus</i>           | Polyphagous                      | Leaves, fruit, flowers                                      | MEDIUM               | HIGH                    | HIGH             | MEDIUM                   | MEDIUM       |
| <b>Valley grasshopper</b>                    | Locu      | <i>Oedaleonotus enigma</i>       | Polyphagous <sup>98</sup>        | Foliage, flowers, young fruit                               | LOW                  | MEDIUM                  | HIGH             | MEDIUM                   | LOW          |
| <b>Brassy cutworm</b>                        | Lep       | <i>Orthodes rufula</i>           | Polyphagous                      | Primary buds  | LOW                  | MEDIUM                  | MEDIUM           | MEDIUM                   | LOW          |

<sup>95</sup> Transport on fruits and flowers

<sup>96</sup> Indirect damage through rot-derived reduction in quality is more important than direct

<sup>97</sup> Includes grapevine, citrus, apple, pear, cherry, peach, apricot, prune, plum, almond, avocado, cabbage, tomato, beet, beans, marigold, alfalfa, clover, timothy, corn and barley

<sup>98</sup> Mainly grasses and shrubs also alfalfa, cotton, grains and vegetables

| Common name                            | Life form | Scientific name                     | Primary host   | Plant part affected  | Entry potential        | Establishment potential | Spread potential    | Economic impact        | Overall risk        |
|--|-----------|-------------------------------------|--|--|------------------------|-------------------------|---------------------|------------------------|---------------------|
| Little bear beetle                     | Btle      | <i>Paracotalpa ursina</i>           | Polyphagous  | Shoots   | LOW                    | MEDIUM                  | MEDIUM              | LOW                    | VERY LOW            |
| Desert dampwood termite                | Iso       | <i>Paraneotermes simplicicornis</i> | Polyphagous  | Heartwood, deadwood  | HIGH                   | HIGH                    | MEDIUM              | HIGH                   | HIGH                |
| Grapevine beetle (spotted June beetle) | Btle      | <i>Pelidnota punctata</i>           | American elder, grapevine  | Foliage, fruit   | MEDIUM                 | MEDIUM                  | MEDIUM              | LOW                    | MEDIUM              |
| Variegated cutworm                     | Lep       | <i>Peridroma saucia</i>             | Polyphagous  | Leaves, stems, growing points, fruit, seeds, inflorescence | LOW-MEDIUM             | MEDIUM-HIGH             | MEDIUM-HIGH         | LOW <sup>99</sup>      | VERY LOW-LOW        |
| Vine mealybug                          | Bug       | <i>Planococcus ficus</i>            | Fig, mulberry tree, pomegranate, grapevine                           | Fruit, foliage, flowers                                    | MEDIUM-HIGH            | MEDIUM-HIGH             | MEDIUM              | MEDIUM-HIGH            | LOW-HIGH            |
| Coffee mealybug                        | Bug       | <i>Planococcus lilacinus</i>        | <i>Citrus spp.</i> , <i>Coffea spp.</i> , cocoa, guava               | Leaves, stems, growing points, fruit, inflorescence        | UNKNOWN <sup>100</sup> |                         |                     | UNKNOWN <sup>101</sup> |                     |
| Omnivorous leafroller                  | Lep       | <i>Platynota stultana</i>           | Citrus, bell pepper, cotton, lucerne, pears, peach, maize, grapevine | Leaves, flowers, fruits                                    | HIGH <sup>102</sup>    | HIGH <sup>103</sup>     | HIGH <sup>104</sup> | MEDIUM <sup>105</sup>  | MEDIUM              |
| Minor cicada                           | Bug       | <i>Platypedia minor</i>             | Polyphagous  | Canes, branches, roots                                     | LOW <sup>106</sup>     | LOW-MEDIUM              | LOW-MEDIUM          | LOW                    | NEGLIGIBLE-VERY LOW |

<sup>99</sup> Seriousness of the pest varies between countries

<sup>100</sup> Occurs on bunches

<sup>101</sup> Damages a wide variety of economically important crops

<sup>102</sup> Larvae feed internally on fruit

<sup>103</sup> Broad host range

<sup>104</sup> Short lifecycle with six generations per year

<sup>105</sup> Can cause serious damage, mainly through bunch-rot organisms entering through larvae feeding holes in the skin. May result in over 25% yield loss

<sup>106</sup> Unlikely to be on fruit

| Common name                                   | Life form | Scientific name  | Primary host                  | Plant part affected                 | Entry potential                   | Establishment potential           | Spread potential             | Economic impact                   | Overall risk               |
|---|-----------|--|-------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|------------------------------|-----------------------------------|----------------------------|
| <b>Grape berry, moth (American vine moth)</b> | Lep       | <i>Polychrosis viteana</i> (syn: <i>Endopisa viteana</i> ) | Grapevine                     | Leaves, roots, fruit, inflorescence | <b>MEDIUM</b>                     | <b>HIGH</b>                       | <b>HIGH</b>                  | <b>HIGH</b>                       | <b>HIGH</b>                |
| <b>Japanese beetle</b>                        | Btle      | <i>Popillia japonica</i>                                   | Polyphagous                   | Leaves, roots, fruit, inflorescence | <b>LOW</b> <sup>107</sup>         | <b>MEDIUM</b>                     | <b>MEDIUM</b> <sup>108</sup> | <b>LOW-MEDIUM</b> <sup>109</sup>  | <b>VERY LOW-LOW</b>        |
| <b>Grape mealybug</b>                         | Bug       | <i>Pseudococcus maritimus</i>                              | Apple, peach, pear, grapevine | Leaves, fruits                      | <b>MEDIUM-HIGH</b> <sup>110</sup> | <b>MEDIUM-HIGH</b> <sup>111</sup> | <b>MEDIUM</b> <sup>112</sup> | <b>MEDIUM-HIGH</b> <sup>113</sup> | <b>LOW-HIGH</b>            |
| <b>Cottony maple scale</b>                    | Bug       | <i>Pulvinaria innumerabilis</i>                            | Polyphagous                   | Foliage, fruit, canes               | <b>LOW</b>                        | <b>LOW-MEDIUM</b>                 | <b>LOW</b>                   | <b>LOW</b>                        | <b>NEGLIGIBLE</b>          |
| <b>Cottony maple scale</b>                    | Bug       | <i>Pulvinaria vitis</i>                                    | Grapevine                     | Foliage, fruit, canes               | <b>LOW</b>                        | <b>MEDIUM</b>                     | <b>LOW-MEDIUM</b>            | <b>MEDIUM</b>                     | <b>VERY LOW-LOW</b>        |
| <b>Walnut scale</b>                           | Bug       | <i>Quadraspidiotus juglansregiae</i>                       | Polyphagous                   | Branches, fruiting canes            | <b>LOW</b>                        | <b>LOW</b>                        | <b>LOW</b>                   | <b>LOW</b>                        | <b>NEGLIGIBLE</b>          |
| <b>Western subterranean termite</b>           | Iso       | <i>Reticulitermes hesperus</i>                             | Polyphagous                   | Heartwood, deadwood                 | <b>HIGH</b>                       | <b>HIGH</b>                       | <b>MEDIUM</b>                | <b>HIGH</b>                       | <b>HIGH</b>                |
| <b>Black vine thrips</b>                      | Thri      | <i>Retithrips syriacus</i>                                 | Polyphagous                   | Leaves, fruit, inflorescence        | <b>LOW</b>                        | <b>LOW-MEDIUM</b>                 | <b>LOW-MEDIUM</b>            | <b>LOW</b> <sup>114</sup>         | <b>NEGLIGIBLE-VERY LOW</b> |
| <b>Grapevine thrips</b>                       | Thri      | <i>Rhipiphorothrips cruentatus</i>                         | Polyphagous                   | Leaves, fruit                       | <b>LOW</b> <sup>115</sup>         |                                   |                              | <b>UNKNOWN</b> <sup>116</sup>     |                            |
| <b>Ground root mealy bug</b>                  | Bug       | <i>Rhizoecus falcifer</i>                                  | Polyphagous                   | Roots                               | <b>LOW</b>                        | <b>HIGH</b>                       | <b>MEDIUM</b>                | <b>LOW</b> <sup>117</sup>         | <b>VERY LOW</b>            |

<sup>107</sup> Regarded as an A1 quarantine organism for EPPO. Unlikely to enter due to large size and beetles drop off fruit when disturbed

<sup>108</sup> Adapted to regions where the mean soil temperature is between 17.5° and 27.5°C during the summer, and above -9.4°C in winter

<sup>109</sup> Most destructive insect pest of lawns and herbaceous and woody landscape plants in the eastern USA

<sup>110</sup> May thrive in fruit clusters and are mobile

<sup>111</sup> Broad range of hosts

<sup>112</sup> Tend not to disperse quickly

<sup>113</sup> Wide host range. Do not reduce yield but contaminate fruit and foliage.

<sup>114</sup> Causes considerable economic damage on grapevines (in Israel)

<sup>115</sup> Readily observed on leaves and fruits, and should be found easily during quarantine inspections

<sup>116</sup> Important insect pest of grapevine (in India)

<sup>117</sup> Present in Australia



| Common name                                       | Life form | Scientific name                       | Primary host  | Plant part affected   | Entry potential    | Establishment potential | Spread potential | Economic impact        | Overall risk        |
|---|-----------|---------------------------------------|---|---|--------------------|-------------------------|------------------|------------------------|---------------------|
| Ground root mealy bug                             | Bug       | <i>Rhizoecus kondonis</i>             | Polyphagous   | Roots   | LOW                | HIGH                    | MEDIUM           | LOW                    | VERY LOW            |
| Leafhopper  | Bug       | <i>Scaphoideus</i> spp.               | Polyphagous   | Foliage   | LOW                | LOW <sup>118</sup>      | LOW-MEDIUM       | UNKNOWN <sup>119</sup> |                     |
| Green valley grasshopper (green bird grasshopper) | Locu      | <i>Schistocerca alutacea shoshone</i> | Polyphagous   | Foliage, flowers, young fruit                               | LOW                | MEDIUM                  | HIGH             | MEDIUM                 | LOW                 |
| Vagrant grasshopper (grey bird grasshopper)       | Locu      | <i>Schistocerca nitens nitens</i>     | Polyphagous, including cereals, cassava, sugarcane, ornamentals | Foliage, flowers, young fruit                               | LOW                | MEDIUM                  | HIGH             | MEDIUM                 | LOW                 |
| Californian citrus thrips                         | Thri      | <i>Scirtothrips citri</i>             | Citrus  | Leaves, fruit   | LOW <sup>120</sup> | HIGH <sup>121</sup>     | LOW              | MEDIUM <sup>122</sup>  | LOW                 |
| Mango thrips                                      | Thri      | <i>Scirtothrips mangiferae</i>        | Mango, grapevine  | Flower buds, young fruit, young leaf buds, flowers, foliage | LOW                | MEDIUM                  | MEDIUM           | LOW                    | VERY LOW            |
| California fire ant                               | Hym       | <i>Solenopsis xyloni</i>              | Polyphagous   | Foliage   |                    |                         |                  |                        |                     |
| Strawberry leafroller                             | Lep       | <i>Sparganothis pilleriana</i>        | Grapevine   | Foliage, shoot tips, leaves, inflorescences, grape bunches  | MEDIUM             | HIGH                    | HIGH             | HIGH                   | HIGH                |
| Three-cornered alfalfa hopper                     | Bug       | <i>Spissistilus festinus</i>          | Groundnut, soyabean, cotton, lucerene                           | Foliage, petiole, lateral stems                             | LOW                | LOW-MEDIUM              | LOW-MEDIUM       | LOW                    | NEGLIGIBLE-VERY LOW |

<sup>118</sup> *S. littoralis* – winter chilling necessary for terminating egg diapause

<sup>119</sup> Vector of mycoplasma and Flavescence dorée

<sup>120</sup> Only attacks young fruit and can be transported with fruit, flowers and leaves

<sup>121</sup> Broad host range

<sup>122</sup> A serious pest of citrus

| Common name                      | Life form | Scientific name              | Primary host | Plant part affected | Entry potential | Establishment potential | Spread potential | Economic impact     | Overall risk    |
|----------------------------------|-----------|------------------------------|--------------|---------------------|-----------------|-------------------------|------------------|---------------------|-----------------|
| Cotton leafworm                  | Lep       | <i>Spodoptera littoralis</i> | Polyphagous  | Foliage             | LOW-MEDIUM      | MEDIUM-HIGH             | MEDIUM-HIGH      | LOW-MEDIUM          | VERY LOW-MEDIUM |
| Western yellow striped army worm | Lep       | <i>Spodoptera praefica</i>   | Lucerne      | Foliage             |                 |                         |                  |                     |                 |
| Kanzawa spider mite              | Mite      | <i>Tetranychus kanzawai</i>  | Polyphagous  | Leaves, stems       | MEDIUM          | MEDIUM                  | MEDIUM           | LOW-MEDIUM          | LOW             |
| Pacific spider mite              | Mite      | <i>Tetranychus pacificus</i> | Polyphagous  | Whole plant         | MEDIUM          | MEDIUM                  | HIGH             | HIGH <sup>123</sup> | MEDIUM          |
| Grape whitefly                   | Bug       | <i>Trialeurodes vittatus</i> | Grapevine    | Foliage             | LOW             | MEDIUM-HIGH             | MEDIUM-HIGH      | LOW                 | VERY LOW        |
| Grape root borer                 | Lep       | <i>Vitacea polistiformis</i> | Grapevine    | Roots               | MEDIUM          | MEDIUM                  | MEDIUM           | MEDIUM              | LOW             |
| Leafhopper                       | Bug       | <i>Zygnidia artvinicus</i>   | Polyphagous  | Leaves, stems       | LOW             | MEDIUM                  | MEDIUM           | LOW                 | VERY LOW        |

<sup>123</sup> Can reduce vegetative growth and crop yield. In grapes no effect on yield and sugar content observed (may depend on infestation levels)

## Pathogens

**Table 20.** Viticulture industry pathogen and nematode threat summary table

| Common name   | Life form | Scientific name                                      | Primary host   | Plant part affected                  | Entry potential | Establishment potential | Spread potential | Economic impact | Overall risk |
|---|-----------|--|--|--------------------------------------|-----------------|-------------------------|------------------|-----------------|--------------|
| <b>Roditis leaf discoloration virus<sup>124</sup></b> | Vir       | <i>Roditis leaf discoloration virus</i> (Carmovirus) | Grapevine  | Whole plant                          |                 |                         |                  | UNKNOWN         |              |
| <b>Artichoke Italian latent virus (AILV)</b>          | Vir       | <i>Artichoke Italian latent virus</i> (Nepovirus)    | Artichoke, chicory, grapevine  | Whole plant                          |                 |                         |                  | UNKNOWN         |              |
| <b>Grapevine yellows</b>                              | Plo       | Aster yellows  | Grapevine  | Leaves, shoots, canes, cordon, trunk | LOW             | LOW                     | UNKNOWN          | UNKNOWN         |              |
| <b>Leaf mottle (BLMV)</b>                             | Vir       | <i>Blueberry leaf mottle virus</i> (Nepovirus)       | <i>Vitis labrusca</i> , <i>Vaccinium corymbosum</i> and a range of hosts | Whole plant                          |                 |                         |                  | UNKNOWN         |              |
| <b>Bois noir</b>                                      | Plo       | Bois noir phytoplasma                                | Grapevine, bindweed, hoary cress, black nightshade                       | Whole plant                          | MEDIUM          | MEDIUM                  | UNKNOWN          | MEDIUM          |              |
| <b>Bratislava mosaic virus</b>                        | Vir       | <i>Bratislava mosaic virus</i>                       | Grapevine  | Whole plant                          |                 |                         |                  | UNKNOWN         |              |
| <b>Leaf blotch</b>                                    | Fun       | <i>Briosia ampelophaga</i>                           | Grapevine  | Foliage, fruit                       | MEDIUM          | MEDIUM                  | MEDIUM           | LOW             | VERY LOW     |
| <b><i>Cladosporium</i> leaf spot</b>                  | Fun       | <i>Cladosporium viticola</i>                         | Grapevine  | Leaves                               | LOW             | LOW                     | LOW              | LOW             | NEGLIGIBLE   |

<sup>124</sup> Result of double infection of grapevines with grapevine fanleaf virus and carnation mottle carmovirus

| Common name  | Life form | Scientific name   | Primary host                         | Plant part affected                         | Entry potential              | Establishment potential | Spread potential                 | Economic impact               | Overall risk      |
|--|-----------|---|--------------------------------------|---|------------------------------|-------------------------|----------------------------------|-------------------------------|-------------------|
| <b>Zonate leaf spot (target spot)</b>                              | Fun       | <i>Cristulariella moricola</i>                                  | Polyphagous                          | Leaves                                      | <b>LOW</b>                   | <b>NEGLIGIBLE</b>       | <b>NEGLIGIBLE</b> <sup>125</sup> | <b>LOW</b>                    | <b>NEGLIGIBLE</b> |
| <b>Grapevine ajinashika virus (GAV)</b>                            | Vir       | <i>Grapevine ajinashika virus (Luteovirus)</i>                  | Grapevine                            | Leaves, shoots, canes, cordon, trunk        | <b>NEGLIGIBLE</b>            | <b>LOW</b>              | <b>NEGLIGIBLE</b>                | <b>UNKNOWN</b>                |                   |
| <b>Grapevine asteroid mosaic associated virus (GAMaV)</b>          | Vir       | <i>Grapevine asteroid mosaic associated virus (Marafivirus)</i> | Grapevine                            | Leaves, shoots, canes, trunk                | <b>LOW</b>                   | <b>LOW</b>              | <b>LOW</b>                       | <b>UNKNOWN</b> <sup>126</sup> |                   |
| <b>Grapevine Bulgarian latent virus (GBLV)</b>                     | Vir       | <i>Grapevine Bulgarian latent (Nepovirus)</i>                   | Grapevine                            | Whole plant                                 | <b>LOW</b> <sup>127</sup>    | <b>LOW</b>              | <b>LOW</b>                       | <b>UNKNOWN</b> <sup>126</sup> |                   |
| <b>Grapevine chrome mosaic virus (GCMV)</b>                        | Vir       | <i>Grapevine chrome mosaic virus (Nepovirus)</i>                | Grapevine, celery                    | Whole plant                                 | <b>MEDIUM</b> <sup>128</sup> | <b>MEDIUM</b>           | <b>LOW</b> <sup>129</sup>        | <b>HIGH</b> <sup>130</sup>    | <b>LOW</b>        |
| <b>Flavescence dorée</b>   | Plo       | Grapevine Flavescence dorée phytoplasma                         | Grapevine                            | Whole plant                                 | <b>MEDIUM</b>                | <b>MEDIUM</b>           | <b>UNKNOWN</b>                   | <b>HIGH</b>                   |                   |
| <b>Grapevine berry inner necrosis virus (GBINV)</b>                | Vir       | <i>Grapevine inner necrosis virus (Trichovirus)</i>             | Grapevine                            | Leaves, shoots, canes, cordon, trunk, fruit | <b>NEGLIGIBLE</b>            | <b>LOW</b>              | <b>LOW</b>                       | <b>UNKNOWN</b> <sup>126</sup> |                   |
| <b>Grapevine Joannes Seyve virus (strain on tomato black ring)</b> | Vir       | <i>Grapevine Joannes Seyve virus (Nepovirus)</i>                | Wide host range, including grapevine | Whole plant                                 | <b>MEDIUM</b>                | <b>MEDIUM</b>           | <b>MEDIUM</b>                    | <b>HIGH</b> <sup>126</sup>    | <b>MEDIUM</b>     |

<sup>125</sup> Moves limited distance (50m)<sup>126</sup> Not known in grapevine<sup>127</sup> Transported on fruit, leaves (internally), roots, stems<sup>128</sup> Transported on bark, leaves, seedlings and micropropagated plants, roots, stems, true seeds and wood<sup>129</sup> Likely to spread with infected propagating material<sup>130</sup> Can reduce plant vigour and may kill the vines. Crop loss may reach 70%.

| Common name                               | Life form | Scientific name   | Primary host                                | Plant part affected            | Entry potential             | Establishment potential | Spread potential | Economic impact              | Overall risk      |
|---|-----------|---|---|--------------------------------|-----------------------------|-------------------------|------------------|------------------------------|-------------------|
| <b>Grapevine stunt virus (GSV)</b>        | Vir       | <i>Grapevine stunt virus</i><br>(Uncharacterised)                           | Grapevine                                   | Leaves, shoots, flowers, fruit | <b>LOW</b>                  | <b>LOW</b>              | <b>UNKNOWN</b>   | <b>MEDIUM<sup>131</sup></b>  |                   |
| <b>Ringspot (GTRV)</b>                    | Vir       | <i>Grapevine Tunisian ringspot virus</i><br>( <i>Nepovirus</i> )            | Grapevine                                   | Leaves                         | <b>NEGLIGIBLE</b>           | <b>LOW</b>              | <b>LOW</b>       | <b>LOW</b>                   | <b>NEGLIGIBLE</b> |
| <b>Grapevine viroid cucumber (GVd-c)</b>  | Vir       | <i>Grapevine viroid cucumber</i>  | Grapevine                                   | Whole plant                    |                             |                         |                  | <b>UNKNOWN</b>               |                   |
| <b>Grapevine vitivirus D (GVD)</b>        | Vir       | <i>Grapevine virus D</i><br>( <i>Vitivirus</i> )                            | Grapevine                                   | Trunk, cordon, canes, shoots   | <b>MEDIUM</b>               | <b>MEDIUM</b>           | <b>UNKNOWN</b>   | <b>UNKNOWN<sup>132</sup></b> |                   |
| <b>Grapevine yellow dwarf virus</b>       | Vir       | <i>Grapevine yellow dwarf virus</i><br>( <i>Luteovirus</i> ) <sup>133</sup> | Grapevine                                   | Whole plant                    |                             |                         |                  | <b>UNKNOWN</b>               |                   |
| <b>Grapevine yellow mottle virus</b>      | Vir       | <i>Grapevine yellow mottle virus</i>  | Grapevine                                   | Whole plant                    |                             |                         |                  | <b>UNKNOWN</b>               |                   |
| <b>Grapevine yellow vein mosaic virus</b> | Vir       | <i>Grapevine yellow vein mosaic virus</i><br>( <i>Nepovirus</i> )           | Grapevine                                   | Whole plant                    |                             |                         |                  | <b>UNKNOWN</b>               |                   |
| <b>Black rot</b>                          | Fun       | <i>Guignardia bidwellii</i>   | Grapevine, ornamentals, native trees/shrubs | Stems, foliage, fruit          | <b>HIGH<sup>134</sup></b>   | <b>MEDIUM</b>           | <b>HIGH</b>      | <b>HIGH<sup>135</sup></b>    | <b>HIGH</b>       |
| <b>Needle nematode</b>                    | Nem       | <i>Longidorus breviannulatus</i>  | Beetroot, carrot, strawberry, grapevine     | Whole plant, including roots   | <b>MEDIUM<sup>136</sup></b> | <b>MEDIUM</b>           | <b>MEDIUM</b>    | <b>MEDIUM<sup>137</sup></b>  | <b>LOW</b>        |

<sup>131</sup> Only reported from one variety<sup>132</sup> Associated with corky bark-like symptoms<sup>133</sup> Associated with tomato spotted wilt virus, which is present in Australia but not reported in grapevines<sup>134</sup> Can be transported with fruit, flowers, leaves, stems<sup>135</sup> Crop losses of up to 80%<sup>136</sup> Transported with growing medium accompanying plants, roots

| Common name                                  | Life form | Scientific name                                      | Primary host   | Plant part affected                  | Entry potential | Establishment potential   | Spread potential | Economic impact | Overall risk    |
|--|-----------|--|--|--------------------------------------|-----------------|---------------------------|------------------|-----------------|-----------------|
| <b>Palatinate grapevine yellows (PGY)</b>    | Plo       | Palatinate grapevine yellows phytoplasma             | Grapevine  | Leaves, shoots, canes, cordon, trunk | <b>LOW</b>      | <b>LOW</b>                | <b>UNKNOWN</b>   | <b>UNKNOWN</b>  |                 |
| <b>Peach rosette mosaic virus (PRMV)</b>     | Vir       | <i>Peach rosette mosaic virus (Nepovirus)</i>        | Peach, grapevine                                     | Whole plant                          |                 |                           |                  | <b>UNKNOWN</b>  |                 |
| <b>Petunia asteroid mosaic virus (PeAMV)</b> | Vir       | Petunia asteroid mosaic virus ( <i>Tombusvirus</i> ) | Grapevine  | Whole plant                          | <b>LOW</b>      | <b>LOW</b>                | <b>MEDIUM</b>    | <b>UNKNOWN</b>  |                 |
| <b>Grapevine leaf rust</b>                   | Fun       | <i>Phakopsora euvitis</i>                            | Grapevine  | Leaves                               | <b>HIGH</b>     | <b>HIGH</b>               | <b>HIGH</b>      | <b>MEDIUM</b>   | <b>MEDIUM</b>   |
| <b>Texas root rot</b>                        | Fun       | <i>Phymatotrichoum omnivorum</i>                     | Grapevine, lucerne, alfalfa, apples, cotton, peaches | Leaves, stems, roots                 | <b>LOW</b>      | <b>HIGH<sup>138</sup></b> | <b>LOW</b>       | <b>MEDIUM</b>   | <b>VERY LOW</b> |
| <b>Angular leaf scorch</b>                   | Fun       | <i>Pseudopezizula tetraspora</i>                     | Grapevine  | Foliage                              | <b>MEDIUM</b>   | <b>MEDIUM</b>             | <b>HIGH</b>      | <b>HIGH</b>     | <b>MEDIUM</b>   |
| <b>Rotbrenner</b>                            | Fun       | <i>Pseudopezizula tracheiphila</i>                   | Grapevine  | Foliage                              | <b>MEDIUM</b>   | <b>MEDIUM</b>             | <b>HIGH</b>      | <b>HIGH</b>     | <b>MEDIUM</b>   |
| <b>Raspberry ringspot virus (RpRSV)</b>      | Vir       | <i>Raspberry ringspot virus (Nepovirus)</i>          | Currants, raspberry, strawberry, grapevine           | Whole plant                          |                 |                           |                  | <b>UNKNOWN</b>  |                 |
| <b>Grape root rot (Roesleria root rot)</b>   | Fun       | <i>Roesleria subterranea</i>                         | Grapevine, apples, pears, plums                      | Roots                                | <b>LOW</b>      | <b>LOW</b>                | <b>LOW</b>       | <b>MEDIUM</b>   | <b>VERY LOW</b> |
| <b>Tomato black ring virus (TBRV)</b>        | Vir       | <i>Tomato black ring virus (Nepovirus)</i>           | Onion, leek celery, tomato, grapevine                | Whole plant                          |                 |                           |                  | <b>UNKNOWN</b>  |                 |

<sup>137</sup> Economic impact through vectoring plant viruses, including raspberry ring spot virus (RRV) and tomato black ring virus (TomBRV)

<sup>138</sup> Spores can remain in the soil for several years

| Common name                                    | Life form | Scientific name                                    | Primary host  | Plant part affected                  | Entry potential              | Establishment potential      | Spread potential             | Economic impact            | Overall risk  |
|--|-----------|--|---|--------------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|---------------|
| <b>Vergil bungs krankheit</b>                  | Plo       | Vergil bungs krankheit phytoplasma                 | Grapevine   | Whole plant                          | <b>MEDIUM</b>                | <b>MEDIUM</b>                | <b>UNKNOWN</b>               | <b>MEDIUM</b>              |               |
| <b>North American grapevine yellows (NAGY)</b> | Plo       | Virginia grapevine yellows I (NAGY I)              | Grapevine   | Leaves, shoots, canes, cordon, trunk | <b>LOW</b>                   | <b>LOW</b>                   | <b>UNKNOWN</b>               | <b>HIGH</b>                |               |
| <b>North American grapevine yellows (NAGY)</b> | Plo       | Western X Virginia grapevine yellows III (NAGYIII) | Grapevine   | Leaves, shoots, canes, cordon, trunk | <b>LOW</b>                   | <b>LOW</b>                   | <b>UNKNOWN</b>               | <b>HIGH</b>                |               |
| <b>Bacterial blight (bacterial necrosis)</b>   | Bac       | <i>Xanthomonas ampelina</i>                        | Grapevine   | Systemic                             | <b>HIGH</b>                  | <b>MEDIUM</b> <sup>139</sup> | <b>MEDIUM</b> <sup>140</sup> | <b>HIGH</b> <sup>141</sup> | <b>MEDIUM</b> |
| <b>Dagger nematode</b>                         | Nem       | <i>Xiphinema americanum</i> <sup>142</sup>         | Orchard, grapevine, forests, grains, legumes, ornamentals | Whole plant, including roots         | <b>MEDIUM</b> <sup>143</sup> | <b>MEDIUM</b>                | <b>MEDIUM</b>                | <b>MEDIUM</b>              | <b>LOW</b>    |
| <b>Pierce's disease</b>                        | Bac       | <i>Xylella fastidiosa</i>                          | Polyphagous <sup>144</sup>                                | Systemic                             | <b>HIGH</b>                  | <b>HIGH</b> <sup>145</sup>   | <b>HIGH</b> <sup>146</sup>   | <b>HIGH</b> <sup>147</sup> | <b>HIGH</b>   |

As part of the threat identification process carried out in developing and reviewing the TSTs, a number of viruses were identified as having a negligible economic impact and overall risk based on current information. Therefore, these pests have not been listed in the treat summary tables. These pests will be assessed again in future revisions of the IBP. Viruses that fall into this category were *Grapevine Algerian latent virus* (*Tombusvirus*), *Grapevine labile rod shaped virus*, *Grapevine line pattern virus* (*Ilarvirus*), and *Grapevine red globe virus* (*Maculavirus*).

<sup>139</sup> Prefers hot and humid conditions

<sup>140</sup> Seed-borne but limited host range

<sup>141</sup> Reduced productivity and shortened life of vines (cultivar specific)

<sup>142</sup> Divided into at least 15 species with virus specificity

<sup>143</sup> Moved with plants/roots with growing medium

<sup>144</sup> Including grapevine and a wide range of commercially important crops

<sup>145</sup> Occurs in areas with a mild winter

<sup>146</sup> All sucking insects that feed on xylem fluid are potential vectors

<sup>147</sup> Can result in 100% yield loss and vine mortality

## Explanation of terms used in the threat summary tables

### Life form legend

|             |  |
|-------------|--|
| <b>Bac</b>  | Bacteria   |
| <b>Btle</b> | Beetles, weevils, etc. (COLEOPTERA)                                      |
| <b>Bug</b>  | Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers (HEMIPTERA) |
| <b>Fly</b>  | Flies and midges (DIPTERA)   |
| <b>Fun</b>  | Fungus   |
| <b>Hym</b>  | Ants and wasps (HYMENOPTERA)   |
| <b>Iso</b>  | Termites (ISOPTERA)  |
| <b>Lep</b>  | Butterflies and moths (LEPIDOPTERA)                                      |
| <b>Locu</b> | Locusts and grasshoppers (ORTHOPTERA)                                    |
| <b>Mite</b> | Mites, including spider and gall mites (ACARI)                           |
| <b>Nem</b>  | Nematode   |
| <b>Plo</b>  | Phytoplasma-like organism  |
| <b>Thri</b> | Thrips (THYSANOPTERA)  |
| <b>Vir</b>  | Viruses  |

### Entry potential

|                   |   |
|-------------------|---|
| <b>Negligible</b> | Probability of entry is extremely low given the combination of factors including the distribution of the pest source, management practices applied, low probability of pest survival in transit |
| <b>Low</b>        | Probability of entry is low, but clearly possible given the expected combination of factors described above   |
| <b>Medium</b>     | Pest entry is likely given the combination of factors described above   |
| <b>High</b>       | Pest entry is very likely or certain given the combination of factors described above   |
| <b>Unknown</b>    | Pest entry potential is unknown or very little of value is known  |



## Establishment potential

|                   |  |
|-------------------|--|
| <b>Negligible</b> | The pest has no potential to survive and become established  |
| <b>Low</b>        | The pest has the potential to survive and become established in approximately one third or less of the range of hosts. Could have a low probability of contact with susceptible hosts  |
| <b>Medium</b>     | The pest has the potential to survive and become established in between approximately one-third and two thirds of the range of hosts   |
| <b>High</b>       | 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 |
| <b>Unknown</b>    | The establishment potential of the pest is unknown or very little of value is known  |

## Spread potential

|                   |   |
|-------------------|---|
| <b>Negligible</b> | The pest has no potential for natural spread                                |
| <b>Low</b>        | The pest has potential for natural spread locally                           |
| <b>Medium</b>     | The pest has potential for natural spread throughout a physiographic region |
| <b>High</b>       | The pest has potential for natural spread to all production areas           |
| <b>Unknown</b>    | Spread potential is unknown or very little of value is known                |

## Economic impact

|                   |  |
|-------------------|--|
| <b>Negligible</b> | There is no impact on yield, host longevity, production costs or storage                       |
| <b>Low</b>        | There is minor impact on standing crop and little effect on stored product                     |
| <b>Medium</b>     | There is moderate impact on crops, but host mortality is rare, storage losses may occur        |
| <b>High</b>       | There is severe impact on standing crop, with significant host mortality and/or storage losses |
| <b>Extreme</b>    | There is extreme impact on standing crop, with extreme host mortality and/or storage losses    |
| <b>Unknown</b>    | The economic potential of the pest is unknown or very little of value is known                 |



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