Biosecurity Manual for the Viticulture Industry

Reducing the risk of new pests impacting your vineyard

Version 1.0
Plant Health Australia (PHA) is the national coordinator of the government-industry partnership for plant biosecurity in Australia. As a not-for-profit company, PHA services the needs of Members and independently advocates on behalf of the national plant biosecurity system. PHA’s efforts help minimise plant pest impacts, enhance Australia’s plant health status, assist trade, safeguard the livelihood of producers, support the sustainability and profitability of plant industries and the communities that rely upon them, and preserve environmental health and amenity.

www.planthealthaustralia.com.au

The Australian Table Grape Association is the peak industry body representing commercial table grape growers from across the country. The table grape Industry Advisory Committee plays an important role in capturing the expertise of the industry and shaping industry investment.


Dried Fruits Australia (DFA) is the peak body representing the dried fruits industry. DFA provides services and initiatives of commercial benefit to grower members with the objective of maximising profitability to all industry stakeholders.

www.driedfruitsaustralia.org.au

Wine Grape Growers’ Australia is the national grower body for all winegrape growers and associated entities. It forms policies and advocates for grapegrowers nationally – to government, within the wine industry and to the wider community.

www.wgga.com.au

Grape and Wine Research and Development Corporation invests in and directs research, development and extension along the whole value chain ‘from vine to glass’ to enhance the profitability, competitiveness and sustainability of the Australian wine sector.

www.gwrdc.com.au

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An electronic copy of this manual is available from the website listed above and from the Farm Biosecurity website

www.farmbiosecurity.com.au

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# Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six easy ways to protect your vineyard</td>
<td>2</td>
</tr>
<tr>
<td><strong>Biosecurity overview</strong></td>
<td>4</td>
</tr>
<tr>
<td>What is biosecurity?</td>
<td>4</td>
</tr>
<tr>
<td>What is vineyard biosecurity?</td>
<td>4</td>
</tr>
<tr>
<td>Regional biosecurity</td>
<td>5</td>
</tr>
<tr>
<td><strong>Pests</strong></td>
<td>6</td>
</tr>
<tr>
<td>High priority exotic pest threats of the viticulture industry</td>
<td>6</td>
</tr>
<tr>
<td>Priority viticulture pests already present in Australia</td>
<td>10</td>
</tr>
<tr>
<td><strong>Early detection and reporting of pests</strong></td>
<td>12</td>
</tr>
<tr>
<td>Pest monitoring and surveillance</td>
<td>12</td>
</tr>
<tr>
<td>Reporting suspect pests or symptoms</td>
<td>13</td>
</tr>
<tr>
<td>Pest identification (diagnostic) services</td>
<td>14</td>
</tr>
<tr>
<td>The Emergency Plant Pest Response Deed</td>
<td>15</td>
</tr>
<tr>
<td>Owner Reimbursement Costs</td>
<td>15</td>
</tr>
<tr>
<td><strong>Production management</strong></td>
<td>16</td>
</tr>
<tr>
<td>Planting and propagating material</td>
<td>16</td>
</tr>
<tr>
<td>Chemical residues</td>
<td>17</td>
</tr>
<tr>
<td>Waste fruit and plant material</td>
<td>17</td>
</tr>
<tr>
<td><strong>Biosecurity and Quality Assurance</strong></td>
<td>18</td>
</tr>
<tr>
<td>Quality assurance schemes</td>
<td>18</td>
</tr>
<tr>
<td><strong>People and biosecurity</strong></td>
<td>20</td>
</tr>
<tr>
<td>Managing people movement</td>
<td>20</td>
</tr>
<tr>
<td>Casual workers and tourists</td>
<td>20</td>
</tr>
<tr>
<td>Overseas travellers</td>
<td>20</td>
</tr>
<tr>
<td>Contractors and utility providers</td>
<td>21</td>
</tr>
<tr>
<td>Biosecurity signage</td>
<td>21</td>
</tr>
<tr>
<td><strong>Equipment and vehicles</strong></td>
<td>23</td>
</tr>
<tr>
<td>Movement of vehicles and machinery</td>
<td>23</td>
</tr>
<tr>
<td>Wash-down facilities</td>
<td>24</td>
</tr>
<tr>
<td>Vehicle access and designated parking areas</td>
<td>25</td>
</tr>
<tr>
<td><strong>Phylloxera in Australia</strong></td>
<td>26</td>
</tr>
<tr>
<td><strong>Biosecurity best practice checklist</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Nursery provider best practice checklist</strong></td>
<td>34</td>
</tr>
<tr>
<td><strong>Further information</strong></td>
<td>36</td>
</tr>
<tr>
<td>Contact details</td>
<td>36</td>
</tr>
<tr>
<td>Visitor register</td>
<td>38</td>
</tr>
<tr>
<td>Pest surveillance data sheet</td>
<td>39</td>
</tr>
<tr>
<td>Production value summary record</td>
<td>40</td>
</tr>
<tr>
<td><strong>Fact sheets</strong></td>
<td>42</td>
</tr>
<tr>
<td>Spotted-winged drosophila</td>
<td>42</td>
</tr>
<tr>
<td>Grapevine red blotch-associated virus</td>
<td>44</td>
</tr>
<tr>
<td>Black rot</td>
<td>46</td>
</tr>
<tr>
<td>Glassy-winged sharpshooter</td>
<td>48</td>
</tr>
<tr>
<td>Grape berry moths</td>
<td>50</td>
</tr>
<tr>
<td>Grapevine leaf rust</td>
<td>52</td>
</tr>
<tr>
<td>Vine and Grape mealybug</td>
<td>54</td>
</tr>
<tr>
<td>Angular leaf scorch and Rotbrenner</td>
<td>56</td>
</tr>
<tr>
<td>Pierce’s disease</td>
<td>58</td>
</tr>
<tr>
<td>Bacterial blight of grapevine</td>
<td>60</td>
</tr>
</tbody>
</table>
Six easy ways to protect your vineyard

You have an important role to play in protecting your vineyard and the entire viticulture industry from biosecurity threats.

Here are six easy ways you can reduce the threat of new pests impacting on your livelihood. Each of these practices should be embedded in the day-to-day management of your vineyard as they make good business sense by reducing the risk of spreading pests. Don’t put your livelihood at risk by neglecting vineyard biosecurity.

1. Be aware of biosecurity threats
   Make sure you and your vineyard workers are familiar with the most important exotic pest threats of grapevines. Conduct a biosecurity induction session to explain required hygiene practices for people, equipment and vehicles in your vineyard.

2. Use pest-free propagation material
   Ensure all propagation material is from trusted sources and vineyard inputs are fully tested, pest-free and preferably certified. Keep good records of your vineyard inputs.

3. Keep it clean
   Practising good sanitation and hygiene will help prevent the entry and movement of pests onto your vineyard. Workers, visitors, vehicles and equipment can spread pests, so make sure they are clean before entering and leaving your vineyard. Limit entry points to the property, have a designated visitor’s area and provide vehicle and personnel wash-down facilities.

4. Check your vineyard
   Monitor your grapevines frequently. Knowing the usual appearance of your vineyard and grapevines will help you recognise new or unusual plant symptoms or pests. Keep written and photographic records of all unusual observations. Constant vigilance is vital for early detection of any exotic plant pest.

5. Abide by the law
   Be aware of and respect laws and regulations established to protect the viticulture industry, Australian agriculture and your region.

6. Report anything unusual
   If you suspect a new pest – report it immediately to the Exotic Plant Pest Hotline.

EXOTIC PLANT PEST HOTLINE
1800 084 881
The definition of a **pest** used in this manual covers all invertebrates (eg insects, mites, snails, nematodes), pathogens (diseases) and weeds that may harm plants or plant products. **Exotic** pests are those not currently present in Australia. **Established** pests are those present within Australia.

**What is biosecurity?**

Biosecurity is about the protection of livelihoods, lifestyles and the natural environment, which could be harmed by the introduction of new pests.

Biosecurity is a national priority, implemented off-shore, at national and state borders and on-farm. Good biosecurity practices are essential for your business.

Australia’s geographic isolation has meant that we have relatively few of the pests that affect viticulture industries overseas. Continued freedom from exotic pests is a vital part of the future profitability and sustainability of Australia’s viticulture industry. Biosecurity also helps preserve existing trade opportunities and supports new market negotiations.

**What is vineyard biosecurity?**

Vineyard biosecurity is a set of measures designed to protect your grapevines from the entry and spread of pests. Vineyard biosecurity is your responsibility, and that of every person visiting or working on your vineyard.

Through the implementation of vineyard biosecurity measures, growers play a key role in protecting the Australian viticulture industry from exotic pests. If a new pest becomes established in your vineyard, it will affect your business through increased production costs (for monitoring, cultural practices, additional chemical use and labour to apply them), reduced productivity (yield and/or quality reductions) or loss of markets.

Early detection and immediate reporting increases the chance of effective and efficient eradication.
Regional biosecurity

To strengthen the biosecurity measures implemented on your property, it is important to promote biosecurity at a regional level by raising community awareness at regional meetings or events. Through this collaborative approach, biosecurity threats to all properties in your region can be minimised.

Potential sources of biosecurity threats may be neighbouring vineyards (operating or abandoned), nurseries, other commercial plantings, native vegetation and/or peri-urban residential or amenity plantings.

Promotion of vineyard biosecurity at the regional level is enhanced through broad engagement of the community, understanding the region’s vulnerability, and the source and nature of threats. Vineyard biosecurity at the regional level requires a strong commitment from growers and stakeholders to implement biosecurity measures, regular pest surveillance and timely reporting.

Implementation of vineyard biosecurity underpins regional biosecurity, which in turn underpins national biosecurity.
High priority exotic pest threats of the viticulture industry

The following are some key exotic pests that are a threat to the Australian viticulture industry. The climate of Australian grape production regions would allow each of these pests to survive, spread and establish, should they be introduced. Any of these pests would have serious consequences should they enter and become established in Australia. Additional information on these pests is included in the fact sheets at the back of this manual.

These key pests were identified through the development of the Viticulture Industry Biosecurity Plan (IBP). For a complete list of exotic pest threats for the viticulture industry, refer to the latest version of the Viticulture IBP available by contacting PHA (www.phau.com.au) or your peak industry body through the details listed on page 36.

**Spotted-winged drosophila (Drosophila suzukii)**

**OVERALL RISK – HIGH**
- Attacks a range of soft skinned fruit species
- Egg deposition and larval feeding can occur in maturing, firm fruit
- Larvae feed internally on fruit, are cream coloured and are about 3 mm long
- Secondary infections can occur at egg laying sites, leading to fruit rot
- Spreads throughout crops by flight or longer distances with infested plant material
- Present through North America and some parts of Asia

**Phylloxera (Daktulosphaira vitifoliae) (exotic strains)**

**OVERALL RISK – MEDIUM/HIGH**
- A number of highly virulent strains of Phylloxera not yet present in Australia exist throughout most of the world’s viticultural regions
- This small aphid – like insect is spread through infested plant material and soil
- Infested vines will show low vigour during spring/early summer, then show yellowing and/or marginal reddening of the leaves during late summer/early autumn
- Other visual symptoms include galls on fibrous roots and in some cases obvious galls will appear on the leaves
Grapevine red blotch-associated virus (Grapevine red blotch associated virus (Geminivirus))

OVERALL RISK – MEDIUM
- A recently identified and described virus, first detected in California (USA) in 2008
- Causes red blotch symptoms on leaves, as well as a significant reduction of up to 5° Brix in the sugar accumulation of grapes
- Spread through grafting and propagation material
- Present in North America

Black rot (Guignardia bidwellii)

OVERALL RISK – HIGH
- A fungus that affects all green tissues of the grapevine, including the fruit
- Can result in complete crop losses in warm and humid growing regions
- Can spread easily over long distances through water and wind-borne spores, as well as through propagation material and fruit
- Present in North America, Asia, Africa, Europe and South America

Glassy-winged sharpshooter (Homalodisca vitripennis)

OVERALL RISK – MEDIUM/HIGH
- A xylem feeding leafhopper that causes direct damage to grapevines through its feeding activities
- Main vector of the exotic Pierce’s disease (Xylella fastidiosa), which is a serious disease of grapevines and numerous other horticultural crops
- Strong fliers that can move rapidly between plants, as well as through plant and propagation material during their egg and nymph phases
- Present throughout eastern and western America, Mexico, Tahiti, Hawaii and the Cook Islands
### Grape berry moths (*Lobesia botrana* and *Polychrosis viteana*)

**OVERALL RISK – HIGH**

- Grape berry moths feed on grape flowers and fruit and can cause significant harvest losses
- Larvae web together grape clusters and penetrate grape berries, hollowing them out and leaving only the skin and seeds
- Adults can fly rapidly between host plants and larvae can spread through infested fruit and grapevine material
- *L. botrana* is present throughout North America
- *P. viteana* is present throughout Europe, North America, the Middle East and some parts of Asia, Africa and South America

### Grapevine leaf rust (*Phakopsora euvitis*)

**OVERALL RISK – MEDIUM**

- A fungus that mainly occurs in warm temperate and subtropical growing regions
- Infection mainly affects leaves, but can also affect fruit, stems and canes
- Results in early senescence and leaf drop, which causes weakening of the grapevine and a reduction in fruit quality and quantity
- Can spread easily over long distances through wind-borne spores
- Present throughout Asia, North America, Central America and South America

### Vine mealybug (*Planococcus ficus*) and Grape mealybug (*Pseudococcus maritimus*)

**OVERALL RISK – HIGH**

- Both mealybugs are small, cryptic insects that infest all parts of the grapevine
- Mealybugs produce large amounts of sticky honeydew that damages the fruit and foliage and leads to sooty mould
- Infestation causes the vine to decline in vigour and production
- Spread mainly occurs through propagation material or via movement of fruit
- Vine mealybug is present in Europe, Africa, the Middle East and parts of North and South America
- Grape mealybug is present in Europe, Asia, New Zealand and North and South America
Angular leaf scorch and Rotbrenner (*Pseudopezicula* spp.)

**OVERALL RISK – MEDIUM**
- Both diseases are caused by two separate species of the fungus *Pseudopezicula* spp.
- Causes lesions on leaves which leads to premature senescence
- Can affect flowers before or during bloom, causing them to rot and then dry out
- Spread through water and air-borne spores
- Angular leaf scorch is present in North America
- Rotbrenner is present in Europe

Pierce’s disease (*Xylella fastidiosa*)

**OVERALL RISK – MEDIUM/HIGH**
- Caused by a bacterium that lives in the water conducting system (xylem) of grapevines
- Grapevines show symptoms of water stress, such as leaf scorch, and the plant progressively weakens and dies
- Can be transmitted in infected propagation material and by leafhoppers such as the exotic Glassy-winged sharpshooter
- Present in North America, Central America and some regions of South America

Bacterial blight of grapevine (*Xylophilus ampelinus*)

**OVERALL RISK – MEDIUM**
- Caused by a bacterium that lives in the vascular tissue of infected plants
- Results in a reduction of vine health and major harvest losses in susceptible varieties
- Can be spread through pruning tools, propagation material and wet and windy conditions
- Present in Europe, and in parts of Africa and South America

Remain observant for anything unusual in your vineyard and storage facilities. If a pest is found that is not normally present on your property, it may be new not only to your property, but to the region, state or even Australia. Being able to recognise an unusual pest and promptly report it, is essential for containment and eradication programs.


Priority viticulture pests already present in Australia

**Endemic fruit flies**

The Queensland fruit fly (Qfly) (*Bactrocera tryoni*) and Mediterranean fruit fly (Medfly) (*Ceratitis capitata*) are significant threats to viticulture production and can make it more difficult to access vital export markets.

Qfly is widespread throughout Queensland and has a limited distribution throughout south-eastern Australia. Medfly is restricted to parts of Western Australia.

Further information can be found at [www.preventfruitfly.com.au](http://www.preventfruitfly.com.au) or from your state or territory department of agriculture (see page 36).

**Phylloxera**

Phylloxera (*Daktulosphaira vitifoliae*) is one of the world’s most damaging grapevine pests, and is therefore an important biosecurity issue for the Australian viticulture industry. For more information on this pest and for any movement restrictions that may apply, please see pages 26-28.
Early detection and reporting of pests

12 Pest monitoring and surveillance

Vineyard monitoring and surveillance involves looking for and recording the presence, absence and population levels of pests. Conducting regular monitoring is a fundamental part of vineyard management practices and gives the best chance of spotting a new pest soon after it arrives.

Pest surveillance is important because it assists:

- **Market access**: Export destinations for grapes can require ‘evidence of absence’ data for exotic and some established pests. The Australian viticulture industry, in collaboration with governments, must prove through surveillance that exotic pests have been looked for and found to be absent.

- **Exotic pest eradication**: Early detection of exotic pests improves the chance of eradication or containment within a region. If eradication or containment is not feasible, early detection, in conjunction with contingency planning and preparedness by government and industry bodies (e.g. preparing emergency chemical registrations, permits for importation of biocontrol agents, awareness material and training in pest diagnostics) allows a more rapid and effective response.

- **Vineyard pest management**: Regular inspections of vineyards and post-harvest facilities to detect any pests present and their population levels will inform management practices.

- **Pest status information**: Surveillance at the vineyard level contributes essential information to regional biosecurity efforts and ultimately to the national status (presence or absence) of a pest.

All surveillance activities on your property should be recorded. It is just as important to record a lack of pest symptoms as this helps demonstrate that a pest is absent. Surveillance does not have to be a separate costly exercise but can be incorporated into your routine vineyard activities such as spraying or irrigation inspections. The records you collect can also be used in the response to a pest incursion and provide support to industry surveillance activities. The addition of exotic pests to current datasheets used by consultants is an effective recording mechanism. An example pest surveillance datasheet is included in this manual on page 39.
Reporting suspect pests or symptoms

Early detection and reporting is likely to reduce any quarantine period that may be imposed as well as minimise any long-term damage to your vineyard and the viticulture industry.

Report any unusual or suspect plant pest symptoms immediately via the Exotic Plant Pest Hotline on 1800 084 881.

Calls to the Exotic Plant Pest Hotline will be forwarded to an experienced person in your state or territory government. In some states and territories, the Exotic Plant Pest Hotline operates only during business hours. Outside these hours, leave your full contact information and a brief description of the issue and your call will be followed up as soon as possible. Every report will be taken seriously, checked out and treated confidentially.

Do not send samples without first speaking to someone from the state or territory department, who can discuss the correct type of sample, and how to package and send it to a laboratory for diagnosis.

If you have found a suspected exotic plant pest, the following general precautions should be taken immediately to contain the pest and protect other parts of your vineyard:

• Mark the location of the pest and limit access to the area for both people and equipment.
• Wash hands, clothes and boots that have been in contact with affected plant material or soil.
• Restrict operations in the area while awaiting identification of the suspected exotic pest.

If you see anything unusual, call the Exotic Plant Pest Hotline

EXOTIC PLANT PEST HOTLINE
1800 084 881

Symptoms similar to Grapevine red blotch-associated virus
Pest identification (diagnostic) services

State and territory departments of agriculture are able to provide a range of agricultural diagnostic services. Services can include water, soil and plant nutrition testing, as well as the identification of plant pests. Fees may apply.

For more information on who to contact in your state or territory for these services, please use the contact details listed on page 36.
Owner Reimbursement Costs

Under the EPPRD, growers are eligible for reimbursement (Owner Reimbursement Costs; ORCs) for direct costs incurred as a result of the implementation of an approved Response Plan. ORCs may cover direct grower costs or losses through such actions as the destruction of crops, replacement of grapevines and additional chemical treatments.

Calculation of ORCs is prescribed in the EPPRD, including the different formulae used to accommodate the wide range of crops grown by industry signatories. Viticulture ORCs are calculated using the “Perennial Trees” formula. To ensure that these calculations are accurate, growers should keep records of key information (see page 40).

It is important to remember that ORCs only apply to approved Response Plans aimed at eradication. These are more likely to be developed following early reporting.

The Emergency Plant Pest Response Deed

The Emergency Plant Pest Response Deed (EPPRD) is a formal, legally binding agreement between the Australian government, state and territory governments, plant industry signatories and PHA.

The three industry bodies that represent the viticulture industry (Wine Grape Growers Australia, Australian Table Grape Association Inc. and Dried Fruits Australia) are signatories to the EPPRD. Each signatory to the EPPRD has a seat at the decision making table and also contributes to funding if an approved Response Plan is implemented to eradicate an Emergency Plant Pest (EPP).

Under this agreement, the viticulture industry has a responsibility to report suspect pests. The earlier a new pest is detected, the greater the chance an eradication response will be mounted and the more likely it will be successful.

For more information on the EPPRD refer to www.phau.com.au/epprd
Production management

16 Planting and propagating material

Use only clean planting and propagation material (i.e. tested and certified as pest free). Obtain these only from nurseries that provide reliable records of the material’s source and testing history. For a list of key questions to ask your nursery provider please see page 34.

It is sometimes not possible to visually or reliably assess the health of your planting material. Under some conditions, bacteria, viruses and other disease causing pathogens can remain dormant for extended periods of time within or on the surface of plant tissue before showing any obvious visual symptoms.

To minimise your risk:

- Purchase plant material only from a nursery that takes biosecurity, hygiene, health testing and record keeping seriously.
- Visually check your nursery and planting material on arrival for symptoms of pest presence.
- Maintain a register of your vineyard’s propagation material, including its source (with contact details), cultivar and rootstock combinations, specific planting locations, numbers of plants and date planted.
- Request information on the source of all propagation material, mother vine health testing regime and timetable, location of foundation material of new imports as well as the Quality Assurance scheme or certification status of the nursery itself and the planting material provided.
Chemical residues

Chemical residues on grape produce can result in rejection from export and domestic markets, particularly as these residues can pose a risk to human health.

Appropriate training and advice on the safe use of pesticides should be obtained prior to chemical control of pests. There is a legal obligation to always follow label regulations and withholding periods. Don’t put your livelihood or the industry at risk through poor or illegal practice.

In most states and territories, growers and contractors who apply pesticides must complete an accredited chemical training course (e.g. ChemCert or SMARTTrain) to gain the appropriate knowledge base on the safe use of pesticides and the legal requirements.

Details about regulations for agricultural and veterinary chemicals can be obtained from the Australian Pesticides and Veterinary Medicines Authority (APVMA; www.apvma.gov.au) or from relevant state and territory governments. Consult these sources frequently for information regarding chemical regulations as these may change.

Waste fruit and plant material

Maintaining good vineyard, packing facility and nursery hygiene can minimise cross-contamination and environments that promote pest proliferation. It is particularly important to dispose of waste fruit and all plant material carefully.

Waste plant material should be disposed of away from nurseries, vineyard areas, water sources and packing sheds. Additional precautions should be taken when dealing with any material (including prunings and fruit) removed due to suspected pest damage to ensure that healthy plants are not exposed to potentially infected or infested plant material. Appropriate disposal mechanisms for plant waste include deep burial (away from production areas) or burning.

Ensure that any machinery, equipment, vehicles and hand tools that are used when dealing with potentially infected plant material are thoroughly cleaned of all soil and plant residues prior to being used elsewhere on your property.

Chemical residue testing
Biosecurity and Quality Assurance

Quality assurance schemes

Quality Assurance (QA) schemes strengthen the viticulture industry’s potential to detect, control and eradicate plant pest outbreaks rapidly, before extensive damage occurs. Auditable QA schemes and achievement of membership to them, is beneficial in terms of biosecurity, market access, meeting product specifications, customer expectations and food safety.

Ensure that your QA scheme and records allow full traceability. That is, the ability to trace-back plant material on your vineyard to its source (including the scion and rootstock sources, health testing and authenticity records), to trace-forward plant material or produce that has left your property, and to maintain records of surveillance and pest management practices undertaken on your property.

There are many best management practices and quality assurance schemes available; including: ISO 9000, SQF 2000, NIASA, Freshcare and Woolworths Quality Assurance Scheme. If your vineyard is accredited with such assurance schemes, it is likely that some fundamental techniques of biosecurity best practice are already being applied.

The National Vine Accreditation Scheme

The National Vine Accreditation Scheme developed by the Australian Vine Improvement Association (AVIA) provides an audit trail from the point of cutting (or tissue culture) importation to vineyard planting. It requires process controls at each production stage. The certification program allows approved nurseries to produce a product that is ‘AVIA Certified’ and reassures growers that propagation material is traceable to its origin and is true to type. More information on the National Vine Accreditation Scheme can be found at: www.avia.org.au

Australian Standard for Grapevine Propagation Material

The objectives of the Grapevine Propagation Material Standard released in 2013 are to provide the purchaser of grapevine propagation material with assurance as to the origin, varietal identity, physical specifications and health status of grapevine propagation material. It provides for a documented and clear trail back to the original source vine in Australia together with evidence of the method used to identify the original vine(s). The standard also provides evidence of whether material has been tested for vine health, what method of testing has been used, and the details of the pathogens detected in the material. More information can be found at: www.standards.org.au
Best management practices

Every grape grower in the viticulture industry should follow industry endorsed best management practices. The following reports outline best management practices relating to pest and disease control, pasture management, grape growing, harvesting, processing and more.


• The Grapevine Management Guide 2012-2013, which has been produced by the National Wine and Grape Industry Centre. Download the management guide at www.dpi.nsw.gov.au/agriculture/horticulture/grapes
Managing people movement

People moving between vineyards, nurseries and other horticultural regions can spread pests on vehicles, equipment, boots and clothing. Even hair, mobile phones and watchbands can carry fungal spores or bacteria. The most obvious risks are pests carried in soil and plant material.

Implementing the following measures will reduce the threat of human activity introducing new pests into your vineyard:

• Maintain a visitor register (example on page 38), to record visitor movements and help manage safety issues.
• Brief all workers, contractors, and visitors about your vineyard biosecurity measures.
• Employee and visitor footwear, hats and clothing must be free of soil and plant material before entering or leaving the vineyard.
• Provide scrubbing brushes, footbaths or boot covers for people entering or leaving your vineyard, or moving from high risk or contaminated to clean areas of the property.
• Footbaths located at the entrance to production areas must contain strong concentrations of disinfectant. They must be replenished regularly as the build-up of mud, organic matter and rain into these solutions reduces their effectiveness.
• Ensure pruning, grafting and picking groups are particularly diligent about cleaning their knives, secateurs and footwear. At a minimum, secateurs and grafting knives should be cleaned between each row.
• Display biosecurity awareness material in staff rooms, field offices and packing sheds. Keep the messages simple and effective.

Casual workers and tourists

Casual workers including contract harvest crews, backpackers and retirees are often employed to assist with vineyard topworking, pruning, harvesting, picking and packing. These individuals pose a particular biosecurity threat because they regularly move between vineyards and regions. They can potentially carry and spread pests from and to susceptible hosts on their clothing, footwear, hats, gloves and equipment.

Before entering production areas or packing sheds, make sure casual workers are well informed on biosecurity measures at your property, have changed or washed their clothes and boots, and that all tools and equipment are cleaned and disinfected.

Overseas travellers

People returning from overseas are a threat to our biosecurity, especially if they have visited vineyards, nurseries, or markets selling or displaying plant material and produce.

Several specimens carrying grapevine pests have been intercepted at the Australian border and overseas travellers have unknowingly brought in pests in the past. Air travel means exotic plant pests are only a few hours away.
To protect your vineyard from overseas pests, ensure that all people who have recently returned from overseas have cleaned their boots and clothes before entering the vineyard. Great care should be taken to prevent the introduction of plant pests into Australia.

**Contractors and utility providers**

The term ‘contractors’ includes utility providers, vineyard contractors, earthmoving companies and research personnel who may enter a vineyard during their day-to-day operations. As with casual workers, contractors pose a significant risk because of their movement between many properties often on the same day.

Placing biosecurity signs on external property gates can play an important role in raising biosecurity awareness with contractors, especially providers of power, water, gas and communications. Limit the risk of contractors introducing new pests onto your property by requesting all contractors vehicles and equipment be cleaned before starting work on your property. Provide a suitable wash-down bay to carry out this task.

To ensure your property does not become the source of pest infections for others, you have a responsibility to inform contractors of any declared or notifiable pests already present in your vineyard.

**Biosecurity signage**

Biosecurity signs demonstrate your commitment to vineyard hygiene and safety. Signs should be placed at the main gate, external entrances, visitor parking areas and wash-down facilities.

Well-designed signs inform visitors that biosecurity on your property is important and that they share responsibility for maintaining it. The signs also serve to alert people to the potential impact of their visit.

Biosecurity signs at entrances or near storages should direct visitors to contact the owner or vineyard manager and formally register their presence, before entering any production areas. The sign should include important contact details, such as the home telephone number, mobile number and/or UHF channel.


---

**VISITORS**

Please respect FARM BIOSECURITY

Please phone or visit the house before entering.

Do not enter property without prior approval.
Keep to roadways and laneways.
Equipment and vehicles

Movement of vehicles and machinery

Vehicles and vineyard equipment such as sprayers, tractors, mechanical pruning equipment and hand tools can spread pests in adhering soil, plant residues and plant material. Pests can then be introduced to a previously clean property, grapevine block or vine.

It is impractical to stop all vehicle and equipment movement on and off the property, but using dedicated vineyard vehicles, providing wash-down facilities on concrete pads and denying access to dirty machinery can significantly reduce the introduction and spread of pests on your property.

Contractors, re-sellers, service providers and drivers of delivery trucks (nursery stock, fertiliser, etc.) and earth moving equipment should be requested to clean their vehicles and equipment before entering your vineyard or be directed to park well away from production areas. Vineyards open to the public and those open to growers (e.g. for field days, equipment demonstrations etc.) have a heightened risk and therefore designated parking areas away from production blocks should be used.

Inspecting and cleaning machinery is more time and cost effective than managing a new pest

Measures to reduce the risk of pest entry on equipment and vehicles include:

- Cleaning vehicle floors and tyres of soil, plant material and pests, especially after visiting other properties.
- Using your own vehicle to carry visitors around your vineyard.
- Keeping vehicle movement to a minimum, especially on wet soil. Designate regular pathways through the vineyard.
- Hosing off and disinfecting machinery in a designated wash-down area (see page 24) before moving between properties.
- Ensuring contractor equipment is washed down thoroughly to remove any plant material or soil before entering and leaving your vineyard.
- Making sure that borrowed, contracted and second-hand equipment and machinery is cleaned of all plant material and soil before using it on your vineyard.
- Regular cleaning of all tools and equipment, including pallets, pallecons, boxes and any other equipment used in the vineyard, preferably with a disinfectant or bleach solution.
Wash-down facilities

A wash-down facility allows vineyard employees, contractors and visitors to clean their vehicle and equipment (including hand tools) in an easily managed area where wash water is contained. This will ensure that plant material, insects and soil are not moved into or out of your vineyard.

A wash-down area should:

- Be readily accessible and located between the driveway and vineyard roads.
- Be isolated from production areas.
- Have a sealed (concrete or bitumen) or packed gravel surface.
- Have access to high-pressure water capable of dislodging caked mud from equipment/machinery.
- Not drain into a waterway or production area.
- Have a sump or collection area for easy inspection and waste management.

Clean machinery from the top down to avoid contaminating areas already cleaned, and consider the following points:

- Dismantle machinery as far as is practical, to allow access to internal spaces.
- Leave covers off after cleaning to allow inspection.
- Leave metal equipment in the sun as the heat can provide a means of destroying pests.
- Get a second opinion to point out any contamination you may have missed.

For additional protection, use a detergent-based degreaser or broad spectrum disinfectant. Disinfectants are most effective when used on visually clean surfaces so remove as much soil and plant material as possible before applying. Read all instructions and labels on the product before use as some disinfectants can be corrosive to some surfaces such as paints.

The wash-down area may be the same as that used for chemical wash-down of vehicles and equipment. If so, all workplace health and safety issues associated with chemical wash-down areas must be taken into account.
Vehicle access and designated parking areas

Manage vehicle access by reducing the number of vehicle entry points to your property. A well signposted parking area should be provided for all visitors. Ideally, only dedicated vineyard vehicles should be used for transport around your property with other vehicle movement limited.

Parking areas serve to contain the entry of new pests away from production sites and provide an opportunity to inspect vehicles and equipment for soil and plant material. Do not allow the movement of vineyard machinery through the parking area and regularly monitor the area for the presence of new pests.
Phylloxera in Australia

What is Phylloxera?

Grape phylloxera (Daktulosphaira vitifoliae), hereafter referred to as Phylloxera, is one of the world’s most damaging grapevine pests, and is therefore an important biosecurity issue for the Australian viticulture industry. Phylloxera is a small (<1 mm long) aphid-like insect. In Australia it lives and feeds exclusively on the roots of grapevines and occasionally in distinctive galls on grapevine leaves.

Phylloxera originates from eastern North America, where it lives on a range of native grapevine species. However, the insect is now present in most of the world’s viticultural regions, originally as a result of the movement of Phylloxera infested grapevine planting material in the late 1800’s. European grapevines (Vitis vinifera) have little or no tolerance to Phylloxera feeding and almost always die.

Phylloxera sucks sap from vine root tissue, which leads to the development of yellow, fleshy galls (nodosities) on young non-lignified feeder roots, and brown galls (tuberosities) on older lignified storage roots. Feeding by Phylloxera over several years leads to the death of fibrous feeder roots, cracking of older storage roots and secondary root necrosis due to entry of fungal pathogens from the soil. Grapevines infested with Phylloxera gradually lose vigour, turn yellow and become stunted, with new shoots failing to emerge. It can result in the gradual death of the vine.
Distribution of Phylloxera in Australia

Phylloxera was first detected in Australia, in Geelong, Victoria in 1877. Today, the distribution of Phylloxera is confined to a few areas in Victoria and New South Wales. In Victoria, the Phylloxera Infested Zones (PIZ) include: Maroondah; Whitebridge; the North East PIZ; Mooroopna; Nagambie and Upton. In New South Wales, there is the Sydney region PIZ (counties of Cumberland and Camden) and the Albury/Corowa PIZ. Phylloxera has previously been detected in Queensland, however it has not been detected since 1967. Other states and territories of Australia, including the Australian Capital Territory, Tasmania, central inland Queensland, Northern Territory, South Australia and Western Australia are considered Phylloxera Exclusion Zones (PEZ).

PHYLLOXERA MANAGEMENT ZONES, AUSTRALIA
Phylloxera movement restrictions

To prevent the spread of Phylloxera from infested areas, each state and territory has legislation and associated regulations which restrict or prohibit the movement of ‘Phylloxera risk vectors’ – i.e. things that could carry Phylloxera. This includes grapevine material, grape products and vineyard or winery equipment and machinery. Each state and territory has slightly different legislation. Anyone wishing to move any risk products between states and territories must comply with the legislation of the destination state or territory.

For more information on who to contact in your state or territory for Phylloxera movement restrictions that may apply to your region or your commodity, see the contact details listed on page 36.

The Subcommittee for Domestic Quarantine and Market Access (SDQMA) is the national committee that develops the domestic market access conditions for plants and plant products, including Phylloxera risk vectors. The SDQMA attempts to minimise the regulatory burdens on industry by coordinating and harmonising legislation where possible across jurisdictions and regions. This also helps Australia’s international import and export market access conditions and policies. More information about the SDQMA is available at: www.domesticquarantine.org.au

Phylloxera management in Australia

The National Vine Health Steering Committee developed the National Phylloxera Management Protocol (latest version endorsed October 2009). The protocol aims to reduce the risk of Phylloxera spread, while at the same time providing a consistent, technically justified framework for the movement of grapevines, grapevine material and potentially contaminated items between grape growing regions of different Phylloxera status. The end goal is for this national protocol to be expanded and accepted by all states and territories, as the basis from which consistent legislation and integrated regulations for the movement of Phylloxera risk vectors are developed.

In 2012, the National Viticulture Biosecurity Committee was formed to update and implement the National Phylloxera Management Protocol, as well as many other biosecurity related viticulture industry issues. Membership of this committee includes representatives from the wine grape, table grape, dried fruit and nursery industries, as well as representatives from state and territory governments, the Australian Government and other industry organisations such as PHA.
To ensure your property has the best protection against the introduction and spread of new pests, identify the strengths and weaknesses of your vineyard’s biosecurity activities using the following self-assessment questions.

Once identified, a few simple and practical procedures can be implemented to strengthen areas of greatest risk. While changing everyday practices can take some effort in the short term, over time these will become second nature and are both easier and cheaper than dealing with the introduction of a new pest.

For further information and help to improve the biosecurity practices on your property see the farm biosecurity website: www.farmbiosecurity.com.au
Date of biosecurity check: 

<table>
<thead>
<tr>
<th>RECOMMENDED PRACTICES</th>
<th>YES</th>
<th>TO DO</th>
<th>COMMENTS</th>
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<tbody>
<tr>
<td><strong>Pests</strong></td>
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<tr>
<td>Vineyard staff know how and where to report pests</td>
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<td>Pest monitoring is regularly conducted, with activities and results recorded including when nothing is found</td>
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<tr>
<td>Vineyard staff are familiar with common established and exotic viticulture pests and know how to report them</td>
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<tr>
<td>Commercial grapevines and neighbouring vegetation regularly inspected for pests</td>
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<td>Pest awareness material is available to staff</td>
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<tr>
<td><strong>Product management</strong></td>
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<tr>
<td>The origin of planting or propagation material is known and is ‘certified’ or has documented health status</td>
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<tr>
<td>Propagation material is thoroughly checked upon arrival</td>
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<tr>
<td>Records of planting material and its source are maintained</td>
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<tr>
<td>Equipment used to store or transport propagation material or fruit is cleaned on arrival and exit from the property</td>
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<tr>
<td>Fallen or waste fruit, packing shed waste and plant trimmings are disposed of away from production areas and irrigation sources</td>
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<tr>
<td><strong>People movement</strong></td>
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<tr>
<td>Biosecurity signs with contact details are located at all entrances to the property</td>
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<tr>
<td>Staff are trained in biosecurity measures and vineyard hygiene practices</td>
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<tr>
<td>All visitors sign a visitor register on arrival</td>
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<tr>
<td>All visitor and staff clothing, footwear and tools are inspected for loose soil or plant matter before entering and leaving the vineyard</td>
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<tr>
<td>All visitors and workers recently returned from overseas are checked to ensure they have clean footwear and clothing before entering vineyards</td>
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<tr>
<td>Footbaths and scrubbing brushes are provided</td>
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<tr>
<td>The vineyard owner is aware of all neighbouring horticultural enterprises</td>
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<tr>
<td><strong>RECOMMENDED PRACTICES</strong></td>
<td><strong>YES</strong></td>
<td><strong>TO DO</strong></td>
<td><strong>COMMENTS</strong></td>
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<tr>
<td>Equipment and vehicles</td>
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<tr>
<td>Designated parking area for visitors and contractors is available and clearly signposted</td>
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<tr>
<td>Cleaning and wash-down facilities, preferably on a concrete pad, provided for people, machinery and equipment and clearly signposted with instructions</td>
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<tr>
<td>High pressure water or air available for use to remove plant material and soil from equipment and machinery</td>
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<tr>
<td>Sump installed in wash-down facility to catch unwanted weeds and stop run-off</td>
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<tr>
<td>Machinery entering the property is inspected for pests, soil and plant material prior to entering production areas</td>
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<tr>
<td>Borrowed and second-hand machinery and equipment is cleaned and disinfected before use</td>
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<tr>
<td>Vehicle movement is kept to a minimum in production areas</td>
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<tr>
<td>Secateurs used for trimming roots and budding and grafting knives are disinfected between vines</td>
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</tbody>
</table>
The value of good quality planting material to a vineyard cannot be overestimated. Quality vines and planting material are the foundation of a productive, economically viable vineyard. Well managed quality vines will establish quickly and consistently produce high quality fruit with minimum inputs. This results in even, long lived vineyards.

The following checklist is specifically relevant to your planting material and nursery providers to ensure that your property has the best protection against the introduction and spread of pests from new planting material. Identify the strengths and weaknesses of your planting material and nursery provider using the following self-assessment questions.

For further information to help improve the biosecurity practices on your property see the farm biosecurity website:
www.farmbiosecurity.com.au
Date of biosecurity check: __________

<table>
<thead>
<tr>
<th>RECOMMENDED PRACTICES</th>
<th>YES</th>
<th>TO DO</th>
<th>COMMENTS</th>
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</thead>
<tbody>
<tr>
<td><strong>Grapevine material quality</strong></td>
<td></td>
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<tr>
<td>Vines are free from pests</td>
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<tr>
<td>Grafted vines have a fully healed graft union that is not contaminated or over callused</td>
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<tr>
<td>Vines have a good bright colour and are not wet, blackened, mouldy or dried out</td>
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<tr>
<td>Vines are of an even size</td>
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<tr>
<td>Vines have at least 3 evenly spaced well developed roots</td>
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<tr>
<td>Vines have 1 or 2 strong shoots with plump well-formed buds</td>
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<tr>
<td>Unlabelled material or that of unknown origin/undocumented origin is not accepted as planting material</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Vines are not damaged by machinery or vermin</td>
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<td></td>
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<tr>
<td><strong>Nursery provider</strong></td>
<td></td>
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</tr>
<tr>
<td>Nursery is NIASA accredited or BioSecure HACCP accredited</td>
<td></td>
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<tr>
<td>Nursery is accredited with the National Vine Accreditation Scheme (AVIA) or the Australian Standard for Grapevine Propagation Material</td>
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<tr>
<td>Nursery company staff are familiar with exotic and established viticulture pests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An effective monitoring/pest management program is maintained and recorded</td>
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<tr>
<td>Register of all planting material and its specific source is maintained which allows traceability</td>
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<tr>
<td>Water disinfection, sanitation schedules and results are documented</td>
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<tr>
<td>Equipment used to store or transport propagation material is cleaned upon arrival to, or exit from, the property</td>
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<tr>
<td>Fallen or waste fruit, packing shed waste and plant trimmings disposed of away from production areas and irrigation sources</td>
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</tbody>
</table>

For more information on how to make your nursery NIASA and BioSecure HACCP accredited, contact the Nursery and Garden Industry Australia (NGIA). See page 36 for contact details.
## Contact details

### Organisation

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Phone</th>
<th>Email</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Table Grape Association Inc.</td>
<td>(03) 5021 5718</td>
<td><a href="mailto:atga@ncable.com.au">atga@ncable.com.au</a></td>
<td><a href="http://www.australiangrapes.com.au">www.australiangrapes.com.au</a></td>
</tr>
<tr>
<td>Dried Fruits Australia</td>
<td>(03) 5023 5174</td>
<td><a href="mailto:enquiries@driedfruitsaustralia.org.au">enquiries@driedfruitsaustralia.org.au</a></td>
<td><a href="http://www.driedfruitsaustralia.org.au">www.driedfruitsaustralia.org.au</a></td>
</tr>
<tr>
<td>Nursery and Garden Industry Australia</td>
<td>(02) 8861 5100</td>
<td><a href="mailto:info@ngia.com.au">info@ngia.com.au</a></td>
<td><a href="http://www.ngia.com.au">www.ngia.com.au</a></td>
</tr>
<tr>
<td>Wine Grape Growers’ Australia</td>
<td>(08) 8133 4400</td>
<td><a href="mailto:info@wgga.com.au">info@wgga.com.au</a></td>
<td><a href="http://www.wgga.com.au">www.wgga.com.au</a></td>
</tr>
<tr>
<td>Plant Health Australia</td>
<td>(02) 6215 7700</td>
<td><a href="mailto:biosecurity@phau.com.au">biosecurity@phau.com.au</a></td>
<td><a href="http://www.planthealthaustralia.com.au">www.planthealthaustralia.com.au</a></td>
</tr>
<tr>
<td>Farm Biosecurity</td>
<td>(02) 6215 7700</td>
<td><a href="mailto:info@farmbiosecurity.com.au">info@farmbiosecurity.com.au</a></td>
<td><a href="http://www.farmbiosecurity.com.au">www.farmbiosecurity.com.au</a></td>
</tr>
<tr>
<td>Australian Government – Department of Agriculture</td>
<td>(02) 6272 3933</td>
<td></td>
<td><a href="http://www.daff.gov.au">www.daff.gov.au</a></td>
</tr>
<tr>
<td>New South Wales – Department of Primary Industries</td>
<td>1800 808 095 or 02 6391 3100</td>
<td></td>
<td><a href="http://www.dpi.nsw.gov.au">www.dpi.nsw.gov.au</a></td>
</tr>
<tr>
<td>Northern Territory – Department of Primary Industry and Fisheries</td>
<td>1800 808 095 or 08 8999 5511</td>
<td></td>
<td><a href="http://www.nt.gov.au/d/">www.nt.gov.au/d/</a></td>
</tr>
<tr>
<td>Queensland – Department of Agriculture, Fisheries and Forestry</td>
<td>13 25 23 or 07 3404 6999</td>
<td></td>
<td><a href="http://www.daff.qld.gov.au">www.daff.qld.gov.au</a></td>
</tr>
<tr>
<td>South Australia – Department of Primary Industries and Regions</td>
<td>1300 666 010 or 08 8226 0995</td>
<td></td>
<td><a href="http://www.pir.sa.gov.au">www.pir.sa.gov.au</a></td>
</tr>
<tr>
<td>Tasmania – Department of Primary Industries, Parks, Water and Environment</td>
<td>1300 368 550</td>
<td></td>
<td><a href="http://www.dpipwe.tas.gov.au">www.dpipwe.tas.gov.au</a></td>
</tr>
<tr>
<td>Victoria – Department of Environment and Primary Industries</td>
<td>13 61 86 or 03 5332 5000</td>
<td></td>
<td><a href="http://www.depi.vic.gov.au">www.depi.vic.gov.au</a></td>
</tr>
<tr>
<td>Western Australia – Department of Agriculture and Food</td>
<td>(08) 9368 3333</td>
<td></td>
<td><a href="http://www.agric.wa.gov.au">www.agric.wa.gov.au</a></td>
</tr>
</tbody>
</table>
### Visitor register

Please enter your details to assist us with our farm biosecurity records

<table>
<thead>
<tr>
<th>Date</th>
<th>Time on property</th>
<th>Name</th>
<th>Reason for visit</th>
<th>Vehicle registration and mobile</th>
<th>Location/date of last contact with grapevines in the last 8 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arrival</td>
<td></td>
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<td></td>
<td>Departure</td>
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If you see anything unusual, call the Exotic Plant Pest Hotline on 1800 084 881

An electronic version of this Visitor register can be downloaded from the Farm Biosecurity website [www.farmbiosecurity.com.au](http://www.farmbiosecurity.com.au)
## Pest surveillance data sheet

**Vineyard:**

**Scout:**

**Date:**

<table>
<thead>
<tr>
<th>Paddock/row</th>
<th>No. sites</th>
<th>Pest 1</th>
<th>Pest 2</th>
<th>Pest 3</th>
<th>Pest 4</th>
<th>Pest 1</th>
<th>Pest 2</th>
<th>Other pests found</th>
<th>Comments</th>
</tr>
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<tbody>
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**Estimated established pest infestation level (e.g. zero/low/med/high or % crop affected) and established pests presence/absence should be scored. Pests targeted by surveillance must be named before surveillance initiated (for both established and exotic pests).**

An electronic version of this Pest surveillance datasheet can be downloaded from the Farm Biosecurity website: [www.farmbiosecurity.com.au](http://www.farmbiosecurity.com.au)

If you see anything unusual call the Exotic Plant Pest Hotline on 1800 084 881
Production value summary record

Completing the following production value summary each year, and keeping supporting documentation records, will increase the accuracy of Owner Reimbursement Cost calculations if required during an eradication campaign for an Emergency Plant Pest under an approved Response Plan (see page 15 for details). The information that should be collected includes the following.

Year/Season: ____________________________

<table>
<thead>
<tr>
<th>Crop value</th>
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<tbody>
<tr>
<td>Area cropped</td>
<td>Total:</td>
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<tr>
<td></td>
<td>Breakdown by variety</td>
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<tr>
<td></td>
<td>Variety</td>
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<tr>
<td>Yield</td>
<td>Variety</td>
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<td>Market price</td>
<td>Market location</td>
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<tr>
<td>Capital items</td>
<td>Items installed on site</td>
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<td></td>
<td>(e.g. irrigation lines, harvest bins, protective covers, trellising, etc.)</td>
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<tr>
<td>Grapevine value</td>
<td>Stock take of grapevines</td>
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<tr>
<td></td>
<td>Variety (and commercial life)</td>
</tr>
<tr>
<td>Grapevine costs</td>
<td>Grapevines planted this season</td>
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<tr>
<td></td>
<td>Variety</td>
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</table>
### Stored products

<table>
<thead>
<tr>
<th>Products stored</th>
<th>Product/variety</th>
<th>Amount</th>
<th>Time period of storage</th>
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### Pruning and harvesting costs

<table>
<thead>
<tr>
<th>Time</th>
<th>Total staff hours for harvest (including start and finish dates):</th>
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<tr>
<td></td>
<td>Total staff hours for pruning (including start and finish dates). If more than one round, list all dates:</td>
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<thead>
<tr>
<th>Machinery costs</th>
<th>Cost to run/hire machinery for harvest:</th>
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<tbody>
<tr>
<td></td>
<td>Cost to run/hire machinery for pruning:</td>
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<table>
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<tr>
<th>Contractor costs</th>
<th>Cost of employing a harvest contractor (if used):</th>
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<tr>
<td></td>
<td>Cost of employing a pruning contractor (if used):</td>
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</table>

### Net profit from season

<table>
<thead>
<tr>
<th>Total sales</th>
<th>Value:</th>
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<tbody>
<tr>
<td></td>
<td>Evidence (e.g. receipt):</td>
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<table>
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<tr>
<th>Total costs</th>
<th>Value:</th>
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<td>Evidence (e.g. receipt):</td>
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<table>
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<tr>
<th>Total net profit</th>
<th>Value:</th>
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<td>Evidence (e.g. receipt):</td>
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Additional copies of this production value summary can be downloaded from www.farmbiosecurity.com.au/crops
Spotted-winged drosophila

What is the Spotted-winged drosophila?

Spotted-winged drosophila (SWD, Drosophila suzukii) is a newly emerging pest that originated in South-East Asia, but has since spread throughout North America and Europe. SWD is a small fly that attacks a range of soft skinned fruit and reduces crop yield and quality through direct feeding damage and secondary infection of the fruit. This pest has a significant impact on fruit production as the larvae feed on maturing fruit, not just over-ripe or decaying fruit.

The preferred hosts for eggs laid in healthy fruit include grapes, berries, cherries, nectarines and plums. Apples, pears and other fruit with thicker skins are also hosts when fruit begins to rot.

Recent research suggests that there is a different risk of damage from SWD depending on the Vitis spp. or parentage of a particular variety of grapevine grown. For instance, oviposition is frequently recorded from both table grape and wine grape varieties that have predominantly Vitis vinifera parentage. In contrast, other varieties such as V. labrusca as the sole parent have not been recorded to be an oviposition host for SWD. It is also believed that SWD prefer grape varieties with a thin skin, rather than thick skinned varieties.

What does it look like?

Adult SWD are 2-3 mm long with a wing span of around 6-8 mm. They are yellow-brown with dark bands on the abdomen and prominent red eyes. Females have a distinct double serrated ovipositor that is used to puncture the intact skin of suitable fruit and lay eggs. Males are typically smaller than females, and can be distinguished from females by the small dark spots on the end of their wings.
Larvae are cream or white and about 3 mm long. Pupae are red to brown, 2-3 mm in length by 1 mm wide and are cylindrical shaped. The pupae have distinctive pairs of horn-shaped protrusions, which further divide into 7-8 branches which are their respiratory organs.

**What can it be confused with?**

Adult SWD look almost identical to the regular Vinegar fly (*D. melanogaster*). SWD are distinguished from other *Drosophila* species present in Australia by the black spot on the wing tips in males.

**What should I look for?**

Infested fruit show small scars and indented soft spots on the surface, which is left by the ‘stinging’ (ovipositing) females. Larval feeding results in the fruit collapsing around the feeding site. If the attack rates are high by SWD, the entire fruit can collapse. The oviposition scar also exposes the fruit to secondary attack by pathogens and other insects.

Detection of SWD, as with a number of other insect pests that attack fruit, can occur following detection of fruit rot caused by secondary infection by moulds and bacteria.

Although SWD preferentially attack fruit prior to harvest, they can also attack harvested fruits. Look for signs of SWD on fresh fruit in packing houses.

**How does it spread?**

Adult SWD can spread throughout a crop through flight, but longer distance dispersal occurs through movement of plant material (primarily fruit) infested with eggs or larvae.

**Where is it now?**

SWD are native to South-East Asia but have recently spread to become a pest in Japan, North America and Europe.

**How can I protect my farm from the Spotted-winged drosophila?**

Check your vineyard frequently for the presence of new pests and for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**

**EXOTIC PLANT PEST HOTLINE**

**1800 084 881**
Grapevine red blotch-associated virus

What is Grapevine red blotch-associated virus?
Grapevine red blotch-associated virus (GRBaV) is a recently identified and described virus which was first reported on Cabernet Sauvignon in the Napa Valley (California, USA) in 2008. The virus is associated with red blotch symptoms on leaves, as well as causing a significant reduction in sugar accumulation in grapes. Preliminary studies suggest that this virus is not of recent origin, but had instead escaped attention from grape growers in America because of the very similar symptoms to those of Leafroll virus.

What should I look for?
The symptoms of GRBaV generally start appearing in autumn as irregular blotches on leaf blades and the basal portions of shoots. Look for primary and secondary veins on leaves turning red, as well as red blotches between the interveinal margins.

GRBaV can also cause a significant reduction in sugar accumulation of up to 5° Brix as well as increased acidity. It is likely that GRBaV would be first detected in wine grapes, as these grapes are carefully monitored for sugar content to determine harvest date. Look for lower than expected Brix values in both red and white wine grapes.

Unfortunately, much is still unknown about the effect of GRBaV on yield and transmission, and how it may affect different cultivars and rootstocks.

What can it be confused with?
Grapevines with GRBaV cause quite similar symptoms to those caused by Leafroll virus.

However, there are a few distinct differences between the two viruses that can easily be observed. Firstly, grapevines infected with Leafroll virus only turn red in and around the secondary veins of the grapevine leaf, with the primary veins and surrounding area remaining green.
With GRBaV, the primary and secondary veins, as well as the interveinal zones turn red. Secondly, infection with Leafroll virus typically causes the margins of the leaf to roll onto itself, which gives the virus its symptomatic name. However, in GRBaV the leaves do not roll at the margins.

**How does it spread?**

It is believed that the main modes of spread and transmission are through grafting and propagation material. The ability of GRBaV to affect both mature and young grapevines has led researchers to suggest the possibility of a vector for the virus.

**Where is it now?**

GRBaV is a recently described virus. However, preliminary studies have determined the virus is already widespread in both old and mature red and white *V. vinifera* cultivars throughout grape growing regions of America. The sequence of a virus nearly identical to GRBaV has also been detected in Canada.

**How can I protect my vineyard from Grapevine red blotch-associated virus?**

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**

**EXOTIC PLANT PEST HOTLINE**

1800 084 881
Black rot

What is Black rot?
Black rot (Guignardia bidwellii) is a fungal disease of grapevines that can infect all green tissues of the vine, including the fruit. Symptoms are most evident on leaves during spring, on leaves, stems and fruit during summer and then on stems and fruit during autumn and winter months. Black rot can result in complete crop losses in warm and humid grape growing regions.

What should I look for?
On leaves, look for minute, round, reddish-brown spots which appear then enlarge to a maximum diameter of 3-7 mm. As the spots enlarge, they develop black interveinal margins and greyish-tan to reddish-brown centres that are most apparent on the upper leaf surface. Pycnidia (spore bearing structures) develop in the centre of these necrotic spots and appear as small, blackish pimples.

On shoots, stalks and tendrils, look for lesions that are purple to black, sunken, and typically oval or elongated. Pycnidia are commonly observed throughout these lesions with numerous cankers resulting in blighting of the growing tips of shoots. As the canes grow, the bark tends to split along the length of the lesion.

On the fruit, look for brown spots that have a dark ring with a sunken centre which expands to involve the entire fruit. Individual fruit then rots and eventually shrivels into a black, wrinkled mummy. As with leaf spots and stem lesions, black rot mummies are covered with pycnidia.

What can it be confused with?
Black rot symptoms can be confused with Black spot, which is caused by the endemic fungus Elsinoë ampelina. Leaf lesions of both diseases look similar from a distance, but Black spot lesions do not contain the small black spores (pycnidia) which are typically found in Black rot spots and lesions.
Despite this, the range of symptoms caused by *G. bidwellii* is quite distinguishable from symptoms caused by other pests.

**How does it spread?**

Black rot can be spread through water and airborne spores, as well as through infected propagation material and fruit. Spore production, dispersal, infection and continued disease development is favoured by warm and humid conditions, summer rainfall and persistent dew. Black rot can overwinter in canes, tendrils, leaves and fruit on the grapevine and on the ground for up to two years, which provides a source of inoculum for the following season.

**Where is it now?**

Black rot is endemic to North America, but has since spread to Asia, Africa, Central and South America and Europe via contaminated propagation material.

**How can I protect my vineyard from Black rot?**

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**

**EXOTIC PLANT PEST HOTLINE**

1800 084 881
Glassy-winged sharpshooter

What is the Glassy-winged sharpshooter?
The Glassy-winged sharpshooter (GWSS) (*Homalodisca vitripennis*) is a xylem feeding leafhopper that causes direct damage to grapevines through its feeding activities. However, the greatest threat associated with this pest is as the highly efficient vector of the exotic bacterium *Xylella fastidiosa*, which causes Pierce’s disease. Crepe myrtles and many other commercial and ornamental woody and annual plants may harbour the insect. Commercial hosts like grapes, almonds and citrus would be threatened if GWSS became established, particularly if it carries *X. fastidiosa*.

What does it look like?
Adult GWSS are about 12-14 mm long with a dark brown to black colouring and a lighter underside. The upper parts of the head and back are stippled with ivory or yellowish spots, with wings that are partly transparent with reddish veins. Watery excrement often collects on either side of the insect, appearing as large white spots. Clutches of up to 27 eggs are laid on the underside of leaves in a side-by-side arrangement, and dusted with a layer of whitish powder. Following hatching they change in appearance from green water blisters to leave tan to brown scars on the leaves. The immature nymphs are wingless.

What can it be confused with?
Australian leafhoppers from the Auchenorrhyncha suborder share some features with GWSS including larger size, brown colouration and large head with prominent eyes.

What should I look for?
GWSS excretes copious amounts of liquid that can make leaves, stems and fruit appear white washed when dry. Feeding causes no visible signs of damage. Look for egg masses that are usually...
laid into recently expanded foliage. Older foliage will contain the distinctive scars left after the eggs have hatched. If \( X. \) fastidiosa entered Australia with the GWSS, the symptoms of Pierce's disease, such as leaf scorch, leaf drop and brown lesions amongst 'green islands' on stems may be observed.

**How does it spread?**

Adult GWSS are strong fliers and can move rapidly from plant to plant. Nymphs are wingless but can distribute themselves by walking and jumping through the canopy or dropping from plants and walking to new hosts. Most rapid and long distance movement occurs through viable egg masses in nursery stock of either crop or ornamental plants.

**Where is it now?**

GWSS is found in eastern and western USA, Mexico, Tahiti, French Polynesia and Hawaii. It has most recently spread to Easter Island and the Cook Islands.

**How can I protect my vineyard from the Glassy-winged sharpshooter?**

Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**

**EXOTIC PLANT PEST HOTLINE**

1800 084 881
Grape berry moths

What are Grape berry moths (European grapevine moth and American berry moth)?

The European grapevine moth (*Lobesia botrana*) and the American berry moth (*Polychrosis viteana*) are both Grape berry moths. The moths’ larvae feed on grape flowers and fruits, causing direct damage as the larvae penetrate the berry and hollow out the grapes, leaving only the skin and seeds.

What do they look like?

The European grapevine moth is about 5 mm long and has a light brown body, with grey to brown irregular patches on the wings. Young larvae are yellowish green with a dark brown head and are about 1 mm in length. When mature, larvae are about 10-15 mm long and vary in colour from light yellowish green to pale brown, with a yellowish brown head.

The American berry moth is about 6 mm long and has a brown body, with grey-purple bands across the wings and cream with brown spots near the wing tips. Young larvae have a cream body and dark brown head. When mature, the larvae are 10 mm long and become green, then purple with a light brown head.

The only accurate method to effectively identify between the two Grape berry moths is laboratory dissection of the genitalia.

What should I look for?

Both species of Grape berry moth cause nearly identical symptoms. However, it is the larvae, rather than the adult Grape berry moths which are responsible for the majority of the damage to grapevines. Adult females lay eggs on individual grapes, blossoms and stems. Young larvae feed on blossoms or berries, often webbing together entire clusters.
Mature larvae then tunnel into berries and feed inside, leaving a hollowed-out berry with only the skin and seeds. At harvest, severely infected bunches may contain several larvae, and many of the berries may be completely hollowed and have an unhealthy appearance. Damage is compounded by secondary infection of rot pathogens, such as Grey mould (*Botrytis cinerea*).

**How do they spread?**

Adults are highly mobile and can rapidly move between host plants. Larvae can be transported through infested fruit and grapevine material.

**Where are they now?**

The American Berry moth is present throughout North America. The European grapevine moth is present throughout Europe, the Mediterranean, southern Russia, Japan, the Middle East, northern and western Africa, Chile as well as North America.

**How can I protect my vineyard from Grape berry moths?**

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**

1800 084 881
Grapevine leaf rust

What is Grapevine leaf rust?
Grapevine leaf rust is caused by the fungus *Phakopsora euvitis* and mainly occurs in warm temperate and subtropical grape growing regions. Grapevine leaf rust usually infects leaves, but can also infect fruit, stems and rachises. Heavy infestations are common, and can cause early senescence and leaf drop. Grapevine leaf rust can also overwinter as mycelium in grapevine buds.

What should I look for?
Grapevine leaf rust causes small, dark, angular necrotic lesions on the upper surface of grapevine leaves. On the lower leaf surface, the lesions are covered by orange to yellow sporulating pustules.

Infection of Grapevine leaf rust can lead to weakening of the vine, causing premature defoliation, poor shoot growth and a reduction in fruit quality and yield. This results in poor vine growth for the following season and a reduction in the quality and quantity of fruit produced.

What can it be confused with?
Grapevine leaf rust is the only known rust on grapes (*Vitis vinifera*) and therefore has unique symptoms that are unlikely to be confused with other pests.

How does it spread?
Grapevine leaf rust can spread easily over long distances through wind-borne spores, clothing and equipment, as well as through the movement of infested plant material, particularly grapevine leaves.
Where is it now?
Grapevine leaf rust is found on grapevines across Asia, North America, Central America and South America.

An incursion of Grapevine leaf rust occurred in 2001 in the Northern Territory but was eradicated. Ongoing surveys have determined that the region has been free from Grapevine leaf rust since 1 July 2007.

How can I protect my vineyard from Grapevine leaf rust?

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

If you see anything unusual, call the Exotic Plant Pest Hotline

EXOTIC PLANT PEST HOTLINE
1800 084 881
Vine and Grape mealybug

What is the Vine mealybug and Grape mealybug?
Both the Vine mealybug (Planococcus ficus) and Grape mealybug (Pseudococcus maritimus) are small, cryptic insects that infest all parts of the vine and produce large amounts of honeydew (clear, sugary excretions) that damage the fruit and foliage, resulting in unmarketable grapes. The mealybugs also cause the grapevine to decline in vigour and production, as well as transmitting grapevine viruses.

What do they look like?
Vine and Grape mealybug are small (about 3 mm in length) and are difficult to see because of their cryptic nature. Adult mealybugs are soft bodied, segmented insects covered in a white powdery wax. They are slow moving and feed on sap, secreting honeydew as a by-product of their feeding activities. They live in colonies composed of adults, eggs and nymphs. Females are oval and flattened, flightless and have three nymphal stages with no pupal phase. Males are much smaller, have wings and go through four nymphal stages. The Grape mealybug has long tail filaments making the mealybug appear to have a tail. The Vine mealybug is oblong in shape and has shorter filaments around the body, with no tail filament.

What can they be confused with?
Several different species of mealybugs can infest grapevines, some of which are endemic to Australia. The Longtailed mealybug (Pseudococcus longispinus) is present throughout Australia, has long tail filaments and when poked it excretes body contents which are pale yellow. The Citrophilus mealybug (Pseudococcus calceolariae) has dark red body excretions, short thick tail filaments and is confined to south-eastern Australia. The Tuber mealybug (Pseudococcus viburni) has orange excretions and short tail filaments. It is present in some regions of Qld, WA and eastern-Australia.
What should I look for?

Both the Vine mealybug and Grape mealybug can be detected through visual surveys of grapevines. Look for intense ant activity feeding on honeydew secreted by the mealybugs on grapevines, or honeydew on the trunk, cordons, leaves and fruit. Look for white waxy clusters of mealybugs in grapevine crevices which will often be covered with honeydew and black sooty mould.

How do they spread?

Long range dispersal of adults or nymphs may occur through wind-assistance, propagation material or on fruit. Vine and Grape mealybug dispersal as crawlers is limited.

Where are they now?

Vine mealybug is present throughout the Mediterranean, Africa, Middle East, Pakistan, Argentina and in the United States of America. Grape mealybug is present in Europe, Asia, New Zealand, North and South America.

How can I protect my vineyard from Vine and Grape mealybug?

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure that all staff and visitors adhere to on farm biosecurity and hygiene practices.

If you see anything unusual, call the Exotic Plant Pest Hotline
Angular leaf scorch and Rotbrenner

What is Angular leaf scorch and Rotbrenner?
Angular leaf scorch is caused by the fungus *Pseudopezicula tetraspora*. Angular leaf scorch is the American counterpart of the European fungus Rotbrenner, which is caused by *Pseudopezicula tracheiphila* which occurs in the cool grape growing regions of Europe.

Both pathogens attack *Vitis vinifera* and its hybrids, however, cultivars can vary greatly in their susceptibility. Both can seem absent in most years but then become severe in seasons with several prolonged rains, with the ability to cause severe crop losses.

What should I look for?

Symptoms of both Angular leaf scorch and Rotbrenner are very similar because symptoms are predominantly found on the leaves. Lesions first appear as faint, yellowing spots which enlarge, changing from yellow to reddish-brown before the tissue eventually dies. The lesions are typically confined by the major veins and the edge of the leaf and may be several centimetres wide.

On white-fruited cultivars the lesions are initially yellow. On red and black-fruited cultivars lesions are typically bright red to reddish-brown. Late season infections may look like freckled spots. Infected leaves frequently fall from the vine prematurely.

Both pathogens may attack flowers before or during bloom, causing them to rot and dry out. Only the fruit stalks (pedicels) are attacked because both pathogens do not seem to invade the bunch stem (rachis). In severe cases, the berries are destroyed, leaving the rachis of the cluster bearing only a few individual berries or none at all.
What can they be confused with?

Both the symptoms of Angular leaf scorch and Rotbrenner are very similar. Laboratory identification is required to separate the two species.

How do they spread?

Both Angular leaf scorch and Rotbrenner are spread through water and airborne spores. Heavy rainfall and prolonged wetting periods favour pathogen spread and infection. Both species can overwinter in dead leaves on the ground, and in early spring fungal spores are produced that can infect the new season’s growth.

Where are they now?

Angular leaf scorch is currently only known to occur in North America, while Rotbrenner is only known to occur in Europe, particularly France and Germany.

How can I protect my vineyard from Angular leaf scorch and Rotbrenner?

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

If you see anything unusual, call the Exotic Plant Pest Hotline

**EXOTIC PLANT PEST HOTLINE**

1800 084 881
Pierce's disease

What is Pierce's disease?

Pierce's disease is a deadly disease of grapevines caused by the bacteria Xylella fastidiosa. This bacterium lives in the water conducting system (xylem) of the grapevine and is spread between plants by xylem-feeding leafhoppers known as sharpshooters. Glassy-winged sharpshooter, another exotic plant pest, is a key vector.

What should I look for?

Plants infected by Pierce's disease show symptoms of water stress, which includes browning and loss of leaves, lignification of canes and fruit raisining. The characteristic symptom of leaf scorch is observed in late summer and autumn and includes marginal leaf scorch (browning) that is frequently bordered by a red or yellow halo. The outer leaf area may dry suddenly while the rest of the leaf remains green. Affected leaves are less vigorous and smaller than healthy leaves. Ultimately, entire leaves may turn brown and drop, leaving the petioles attached to the plant.

Shoot growth of infected plants also progressively weakens and tips of canes and roots may also die back as symptoms become more pronounced. Symptoms are usually more obvious in grapevines that are stressed by high temperatures or drought conditions.

Flower clusters on infected grapevines may set berries but these usually dry up before reaching maturity. Diseased stems often mature irregularly with patches of green and brown tissue, which are known as ‘green islands’, becoming visible.

What can it be confused with?

While the symptom of scorched leaves can be confused with chloride (salt) toxicity, the occurrence of several symptoms, such as leaf drop, lignification of canes and fruit raising, provides a large degree of confidence that Pierce’s disease is affecting the grapevines.
How does it spread?

Pierce’s disease is transmitted by grafting infected propagation material onto healthy rootstocks and by xylem-feeding leafhoppers. Pierce’s disease is not transmitted through contaminated pruning equipment or by seed transmission.

Where is it now?

Pierce’s disease in grapevines occurs in North America, Central America and some parts of north-western South America.

How can I protect my vineyard from Pierce’s disease?

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

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EXOTIC PLANT PEST HOTLINE
1800 084 881

The Glassy-winged sharpshooter is the main vector of Pierce’s disease among grapevines

‘Green islands’ on a grapevine cane, surrounded by brown necrotic lesions

Berries usually dry out and shrivel up before reaching maturity

For more information visit www.planthealthaustralia.com.au
Bacterial blight of grapevine

What is Bacterial blight of grapevine?
Bacterial blight of grapevine is a serious, chronic and systemic disease of grapevine that affects commercially important cultivars. It is caused by the bacterium *Xylophilus ampelinus* which survives in the vascular tissues of infected plants. Severe infection of susceptible cultivars can lead to a serious reduction in grapevine health and major harvest losses.

What should I look for?
Bacterial blight can affect the leaf, petiole, stem, root, shoot or flowers. Look for key symptoms such as linear reddish-brown streaks that appear and expand upwards on the shoot, darken, crack and develop into cankers. Shoots subsequently wilt, droop and dry up and young shoots may develop pale yellowish-green spots on the lowest internodes. Discolouration is less common on very young shoots, but the whole shoot dies back. Stem cross-section reveals tissue browning.

Cankers can also appear on the sides of petioles leading to one-sided (marginal) leaf necrosis. Necrotic leaf spots also occur sometimes and cankers may also appear on flower and fruit stalks. Flowers which have not reached maturity turn black and die back and roots may also be attacked resulting in retardation of shoot growth.

What can it be confused with?
Confusion may occur with other diseases. Cankers on shoots and leaf spots are similar to those induced by heavy infections by Grape anthracnose (*Sphaceloma ampelinum*), without the brown discolouration of vascular tissue and Phomopsis cane and leaf spot (*Phomopsis viticola*). Although symptom assessment and visual inspection can distinguish between these diseases, laboratory diagnostics should be conducted to confirm the absence or presence of Bacterial blight.
How does it spread?

Bacterial blight is readily transmitted with pruning tools, especially in wet and windy weather. The disease is associated with warm moist conditions, and spread is favoured by overhead sprinkler irrigation. Bacterial blight is able to survive in the wood, and thus may be transmitted from nursery to nursery in infected cuttings. Local spread in vineyards tends to occur along the rows from the initial disease centre. It may also be carried in irrigation water. Natural dispersal is limited to the vineyard and the immediate surrounding area.

Where is it now?

Bacterial blight of grapevine is currently found in South Africa, Spain, Argentina, France, Greece, Crete, Italy, Sicily, Sardinia and Slovenia.

How can I protect my vineyard from Bacterial blight of grapevine?

Only source high health status (preferably certified) plant material from reliable and accredited suppliers. Check your vineyard frequently for the presence of new pests and investigate any sick grapevines for unusual symptoms. Make sure you are familiar with common grapevine pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to on farm biosecurity and hygiene practices.

If you see anything unusual, call the Exotic Plant Pest Hotline

EXOTIC PLANT PEST HOTLINE
1800 084 881

For more information visit www.planthealthaustralia.com.au