

Orchard Biosecurity Manual

for the Cherry Industry

Reducing the risk of new pests
impacting on your orchard

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



Cherry Growers Australia is the national organisation that represents the interests of its member states and orchardists from around Australia.
www.cherrygrowers.org.au

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Six easy ways to protect your property

2 You have an important role to play in protecting your property and the entire cherry industry from biosecurity threats.

Here are six easy ways you can reduce the threat of new pests impacting on your livelihood. Each practice should be embedded in your orchard's everyday management as they make good business sense by reducing the risk of spreading pests. Don't put your livelihood at risk by neglecting orchard biosecurity.

1. Be aware of biosecurity threats

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

2. Use pest-free propagation material

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

3. Keep it clean

Practicing good sanitation and hygiene will help prevent the entry and movement of pests onto your property. Workers, visitors, vehicles and equipment can spread pests, so make sure they are decontaminated before entering and leaving your property. Have a designated visitor's area and provide vehicle and personnel wash-down facilities.

4. Check your orchard

Monitor your trees and fruit frequently. Knowing the usual appearance of your orchard and trees will help you recognise new or unusual events and pests. Keep written and photographic records of all unusual observations. Constant vigilance is vital for early detection of any exotic plant pest threat.

5. Abide by the law

Respect and be aware of laws and regulations established to protect the cherry 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



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Biosecurity overview

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This manual is designed to assist you in protecting your property and the cherry industry from new and invasive pests. By implementing the recommended measures in your day-to-day operations, you will improve your own biosecurity and that of your region, while minimising produce losses and unnecessary costs.

What is biosecurity?

Biosecurity is the protection of your property and the entire industry from the entry, establishment and impact of exotic pests. Biosecurity measures implemented at the orchard level by growers play a key role in protecting the Australian cherry industry from exotic pests.

Australia's freedom from exotic plant pests is vital for the future profitability and sustainability of Australia's plant industries. Biosecurity allows us to preserve existing trade opportunities and provide evidence to support new market negotiations.

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





What is orchard biosecurity?

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

Implementing orchard biosecurity is essential for your business. If a new pest becomes established in your orchard, it may affect your business through increased orchard costs (for monitoring, cultural practices, additional chemical use and labour to apply them), reduced productivity (yield and/or quality reductions) or loss of markets.



John Fitzsimmons

Regional biosecurity

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To strengthen the biosecurity measures implemented on your property, consider including biosecurity issues and activities in community or regional meetings. Through a collaborative approach, biosecurity threats to all properties in your region can be minimised.

Potential sources of biosecurity threats may be neighbouring orchards (operating or abandoned), nurseries, other commercial plantings, native vegetation, gardens, roadside vegetation or amenity plantings.

Promotion of 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, and having knowledge of the expertise base and resources available to the region.

This should be supported by a commitment from stakeholders to implement biosecurity measures, carry out surveillance and report suspect pests. Through these mechanisms a regional framework for biosecurity can be coordinated and is achievable.

Implementation of orchard biosecurity underpins regional biosecurity, which in turn underpins national biosecurity.

Pests

High priority exotic pest threats of the cherry industry

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The following are some key exotic pest threats for the Australian cherry industry as identified through the development of the cherry industry Biosecurity Plan (IBP). Any of these pests would have serious consequences should they enter and become established in Australia. For a complete list of identified exotic pest threats for the cherry industry, refer to the Cherry IBP (available from www.phau.com.au/biosecurity/cherries).

Plum curculio (*Conotrachelus nenuphar*)

OVERALL RISK – MEDIUM

- Damaging weevil pest of cherries in North America
- Weevils are about 5 mm long and grey-brown coloured with four pairs of ridges on the forewings
- Adult weevils can cause scarring and oviposition wounds on fruit and may cause some marginal damage to leaves and blossoms
- Larval feeding causes internal fruit damage leading to fruit drop
- Most likely dispersal over long distances is through movement of packing material contaminated with adult weevils



E. Levine, The Ohio State University, Bugwood.org

Spotted winged drosophila (*Drosophila suzukii*)

OVERALL RISK – UNKNOWN

- Attacks a range of soft skinned fruit species
- Egg deposition and larval feeding can occur in maturing, firm fruit
- Small (2-3 mm in length) flies with yellow-brown colouring, dark bands on the abdomens and red eyes
- Males have a dark spot on the tip of their forewings
- Larvae feed internally on fruit, are cream coloured and about 3 mm long
- Secondary infections can occur at egg laying sites, leading to fruit rot
- Flies spread throughout crops by flight or longer distances with infested plant material



John Davis

Exotic leaf rollers (*Planotortrix* spp.)

OVERALL RISK – HIGH

- Includes Green headed-, Brown headed- and Oblique-banded- leaf rollers
- GHLR moths are 7-14 mm in length and females have dark brown zig-zag markings and a dark spot on the forewings
- BHLR moths are 8-12 mm long with brown wings with a dark oblique mark halfway down the edge of each forewing
- OBLR moths are 16-30 mm long and have reddish-brown wings with strong diagonal bands and a semicircular spot at the wing edge
- Leaf rolling is the obvious symptom though fruit scarring or larval holes in cherries may also be seen
- OBLR are found in North America whilst GHLR and BHLR are only found in New Zealand



Cheryl Moorehead, Bugwood.org

The climate of Australian cherry production regions would allow each of these pests to survive, spread and establish, should they be introduced. Additional information on each of these pest threats is included in the fact sheets at the back of this manual.

Look for anything unusual in your orchard 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.

Plum pox virus (*Plum pox virus (Potyvirus)*)

OVERALL RISK – EXTREME

- Also known as Sharka, the virus affects numerous *Prunus* sp.
- Symptoms are highly variable but may appear on trunks, leaves or fruit
- Leaves may show yellow spots, bands or rings and vein clearing
- Fruit or stones can have a mottled or spotted appearance
- Trunks can split and fruit may drop prematurely
- Spread locally by aphid vectors, but long distance dispersal occurs through movement of infected propagation material



Biologische Bundesanstalt für Land- und Forstwirtschaft, Archive, Bugwood.org

Apple maggot (*Rhagoletis pomonella*)

OVERALL RISK – MEDIUM

- Serious fruit fly pest of North America
- Larvae are cream coloured (up to 10 mm long) and leave a brown trail through fruit flesh
- Small black fly (up to 5 mm long) with yellowish head and legs, a white spot on the back and four irregular or zigzag black bands on the wings
- Sunken dimple-like spots and discolourations develop on the surface of fruit following egg laying and larval feeding
- Damaged fruit drop prematurely



Joseph Berger, Bugwood.org

Cherry X disease (*X disease phytoplasma*)

OVERALL RISK – MEDIUM

- Serious pest of cherry orchards in California
- Leaf rolling and/or spotting may occur and leaf veins may swell
- In mature trees, leaf yellowing is followed by leaf fall, with only a few rosettes remaining at the tips of shoots
- Fruit are often small, pointed and distorted and are pale red to greenish white in colour
- Young trees typically die soon after the first symptoms are observed
- Can be transmitted by budding or grafting but transmission by leafhoppers is the most important means of dispersal



F. Dosba, INRA, Bordeaux, Bugwood.org



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Pest surveillance

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

Pest surveillance is necessary because of:

- **Market access:** Export destinations for cherries can require 'evidence of absence' data for exotic and some established pests that are of concern. The Australian cherry 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. Even 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) assists with a more rapid and effective response.
- **Improved pest management:** Regular inspections of orchards to determine pest presence and population levels will inform management practices.

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

All pest (exotic and established) surveillance activities carried out on your property should be recorded. These records can 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 (see page 25).

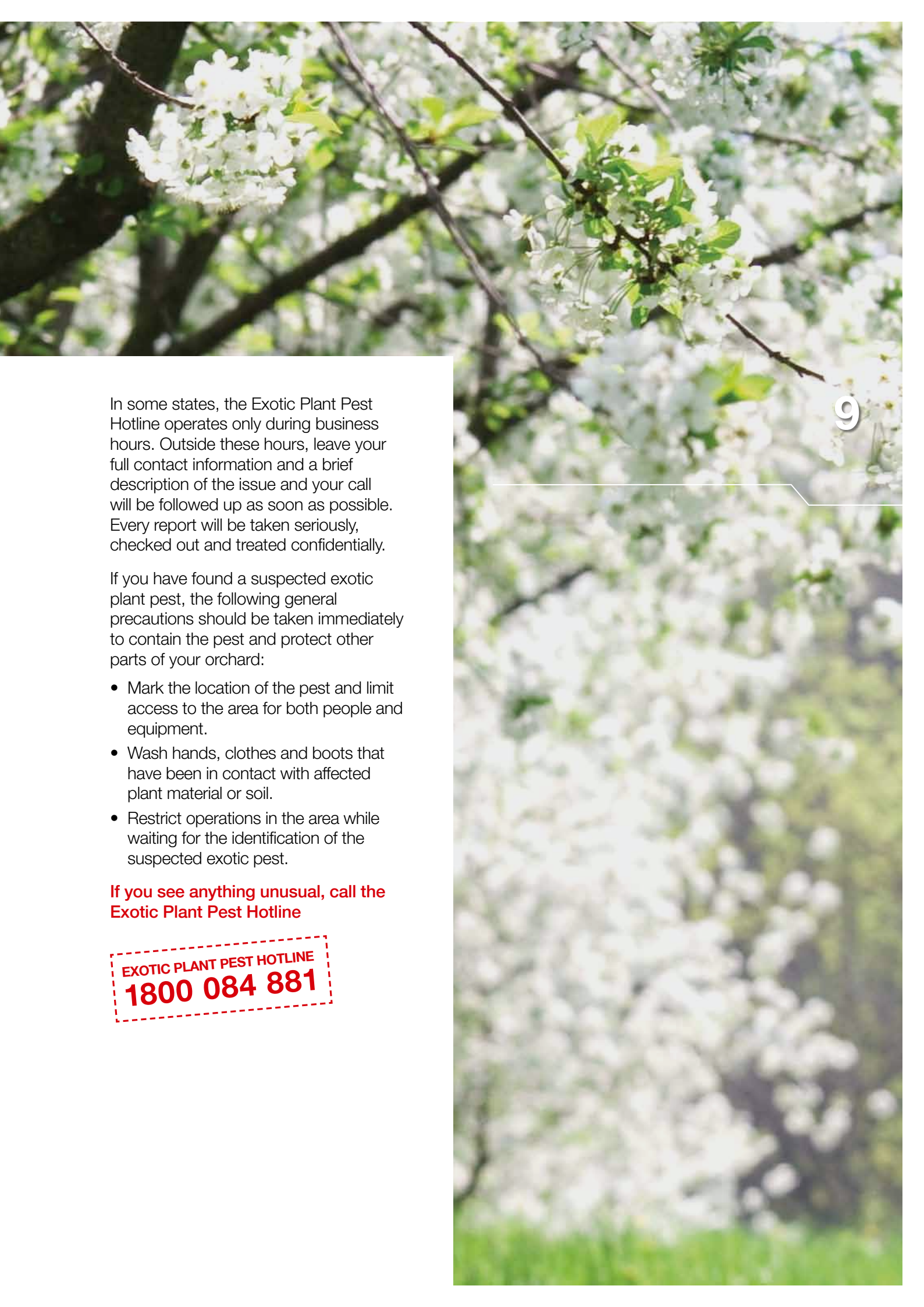
Report suspect pests

Early detection and reporting may prevent or minimise long-term damage to, or the quarantine period of, your orchard and the cherry industry.

Report any unusual or suspect plant pest 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, who will ask some questions about what you have seen and may arrange to collect a sample.

Do not send samples without first speaking to someone from the state department, who can discuss the correct type of sample, its packaging, handling and transport to the laboratory assigned for diagnosis.



In some states, 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.

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 orchard:

- 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 waiting for the identification of the suspected exotic pest.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**

10 The Emergency Plant Pest Response Deed (EPPRD)

The EPPRD is a formal, legally binding document between Plant Health Australia (PHA), Australian and state/territory governments, and plant industry signatories. As a signatory to the EPPRD, Cherry Growers of Australia (CGA) 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 the EPPRD, the cherry 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.



John Fitzsimmons

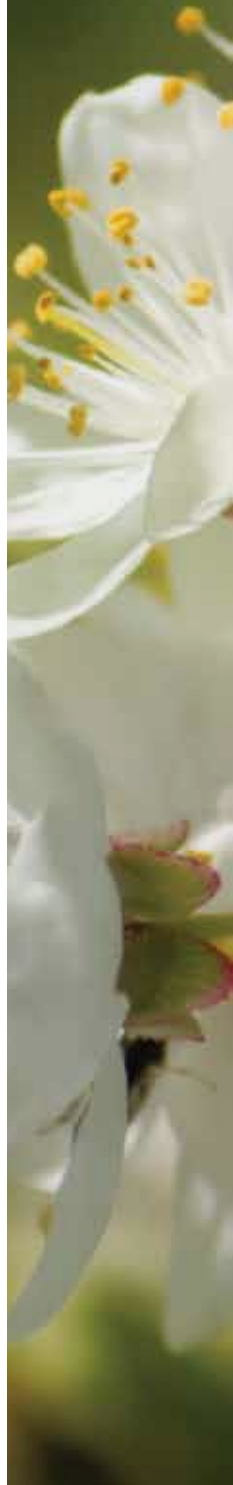
Owner Reimbursement Costs

An underlying principle of the EPPRD is that growers are neither better nor worse off as a result of reporting a suspect EPP. As a result, grower reimbursement payments (Owner Reimbursement Costs; ORCs) may be included 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, enforced fallow periods, replacement of trees 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. Cherry ORCs are calculated using the “Perennial Trees” formula. To ensure that these calculations are accurate, growers should keep records of key value information (example provided on page 26).

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

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





Product management

12 Planting and propagating material

Use only clean planting and propagation material (i.e. material tested with no pest detections). Obtain these only from nurseries that will provide you with reliable records of the material's source and testing history.

You cannot visually assess the health of your planting material. Viruses, viroids and phytoplasmas will not display symptoms under some circumstances, such as on dormant wood and bare roots. Even many bacterial, nematode and fungal pathogens present no obvious symptoms on dormant trees.

To minimise the risk:

- Purchase plant material only from a nursery that takes biosecurity, hygiene, health testing and record keeping seriously.
- Check your nursery and planting material thoroughly.
- Maintain a register of your orchard's propagation material, including its source (with contact details), cultivar/rootstock combinations, specific planting locations, numbers of plants and date planted.
- Request information on the source of budwood, mother tree health testing regime and timetable, location of foundation material of new imports and the Quality Assurance scheme or certification status of the nursery itself and the planting material provided.

Chemical residues

Chemical residues on cherry 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 and 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 agencies. Consult these sources frequently for information regarding chemical regulations as these may change.





Waste fruit and plant material

Maintaining good orchard and nursery hygiene can minimise cross-contamination and breeding environments for pests. This should be achieved in combination with an effective pest monitoring and management program. A ‘spray diary’ record should accompany each consignment of cherry fruit.

Pest levels can build-up in waste plant material, which then acts as a source for pest introduction into the rest of the orchard. To reduce this risk, waste plant material should ideally be collected and disposed of away from nursery and orchard areas and water sources. However, a good first step in reducing the risk is to mulch the waste plant material to encourage breakdown.

Any waste fruit or fruit by-products, in orchards and packing sheds, should be removed or treated quickly to ensure they do not act as a source for pest infestation.

Appropriate disposal mechanisms for plant waste include deep burial (away from production areas), burning or hot composting.

Ensure that no soil, plant material or insects are left adhering to vehicles, bins, and other equipment (including hand tools) used for pruning and harvesting.

Biosecurity and Quality Assurance

If your orchard or the nursery providing your trees is accredited (i.e. maintains a Quality Assured scheme such as ISO 9000, SQF 2000, NIASA, Freshcare or Woolworths Quality Assurance Scheme), it is likely that some fundamental techniques of biosecurity best practice are already being applied.

Ensure that your scheme and your records allow full traceability. That is, the ability to trace-back plant material on your orchard to its source (including the budwood sources, health testing and authenticity records). You should also keep records to track trace-forward plant material or produce that has left your property, as well as records of surveillance and pest management practices undertaken on your property.

Auditable Quality Assurance schemes and achievement of membership to them, is beneficial in terms of biosecurity, market access, meeting specifications and customer expectations, and food safety.



Felsenheim Quarantine



14 Hive Biosecurity

Good hive biosecurity practices minimise the risk of new pest introductions to the Australian honey bee industry. These measures provide benefits to beekeepers and protect the honey and pollination-dependant industries.

There are a number of bee and hive pests currently exotic to Australia that have the potential to severely impact on the honey bee and pollination-dependant industries if they were to become established. Many of these pests are prevalent in neighbouring countries.

The Australian Honey Bee Industry Council (AHBIC), as the peak industry body, has a focus on protecting beekeepers and their hives through sound biosecurity practices.

For more information visit www.honeybee.org.au or call 02 9221 0911.

If you see any unusual signs of pests in your bees call the Emergency Animal Disease Watch Hotline or the Exotic Plant Pest Hotline.



Bee and hive threats

The Australian honey bee industry currently faces several key biosecurity threats. The highest threat is considered to be Varroa mite (*Varroa destructor* and *V. jacobsoni*), which is carried on Asian and European honey bees in countries to the immediate north (Papua New Guinea) and east of Australia (New Zealand).

Varroa mites feed on both adult and broodbees, weakening them and spreading bee pathogens within the colony. Infestation ultimately results in deformed bees, early death of individual bees and slow death of the honey bee colony unless control measures are applied.

Other pest threats to bees include:

- Tracheal mite: Infestations result in sick bees that do not work as hard or live as long as healthy bees. The mite spreads from bee to bee and hive to hive and is difficult to detect.
- *Tropilaelaps clarae* mite: This parasite causes brood death or shortened life span for any bees that survive to adulthood.

The application of biosecurity measures also addresses pests already established in Australia, such as the Small hive beetle, American foulbrood and the European foulbrood of honey bees.



Increasing hive biosecurity

There are a number of things that you can do to improve your orchard biosecurity and to help safeguard Australia's cherry and honeybee industries.

Beekeepers should:	Cherry producers and beekeepers should:
<ul style="list-style-type: none">• Check the health of any bees purchased (get a vendor declaration to define the health status).• Consider hive placement and what pests might be at a new location.• Specifically check for Varroa mite, Tracheal mite and Asian honey bee.• Position hives to limit the transfer of pests from hive to hive.• Consider the stress placed on bees that are regularly moved.• Avoid placing hives in proximity of rubbish tips or where birds are fed honey.• Avoid the placement of hives near abandoned hives or abandoned orchards.• Avoid contact of livestock with the hives.• Regularly inspect bees for unusual behaviour.• Isolate captured swarms for six months to ensure their health and that they are free from pests.	<ul style="list-style-type: none">• Ensure all orchard and hive equipment have been cleaned between uses.• Wash and disinfect hands when moving between hives.• Ensure boots and clothing are free from plant material, soil, insects and other pests before entering and leaving orchards or handling hives.• Minimise the number of people that visit hives.• Prevent vehicles from driving in close proximity to the hives.• Secure honey stores and equipment so robbing bees cannot gain access.• Check reasons for poor fruit set to see if low numbers of bees may have caused poor pollination.• Report anything unusual to the Emergency Animal Disease Watch Hotline or the Exotic Plant Pest Hotline. <div data-bbox="798 1624 1212 1825"><p>EXOTIC PLANT PEST HOTLINE 1800 084 881</p><p>EMERGENCY ANIMAL DISEASE WATCH HOTLINE 1800 675 888</p></div>

People and biosecurity

16 Biosecurity signs

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

Signs also demonstrate your commitment to orchard hygiene, safety and audit systems. Biosecurity signage should be placed at the main gate, external entrances, visitor parking areas and wash-down facilities.

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

Contact Plant Health Australia for further information on obtaining biosecurity signs for your property.



Managing people movement

People moving between orchards, nurseries and other horticultural regions can spread pests on vehicles, equipment, boots and clothing. Even hair 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 orchard:

- Maintain a visitor register (example on page 24), which will record visitor movements and help manage safety issues.
- Brief all workers, contractors, casual workers and visitors of your orchard biosecurity measures.
- Employee and visitor footwear and clothing must be free of soil and plant material before entering or leaving the orchard.
- Provide scrubbing brushes, footbaths, boot covers, rubber boots and protective clothing for people entering or leaving your orchard, or moving from contaminated to clean areas of the property.
- Ensure budding crews are particularly diligent about cleaning their knives and footwear between cuts. At a minimum, knives should be cleaned between each bundle.
- Display biosecurity awareness material in staff rooms, trimming and packing sheds. Keep the messages simple and effective.



Casual workers and tourists

Casual workers (e.g. contract harvest crews, backpackers, retirees, etc.) are often employed to assist with orchard budding, pruning, harvesting/picking and packing. While their contribution is highly valued, they are a particular biosecurity threat because they move orchard-to-orchard and region-to-region. They can potentially carry and spread pests from and to susceptible hosts on their clothing, footwear, gloves, and equipment.

Before entering production areas or packing sheds, make sure casual workers are well briefed on biosecurity measures at your property, have changed or washed their clothes and boots, and 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 orchards, nurseries, or markets where plant material and produce was sold.

Several specimens carrying cherry fruit 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 orchard from overseas pests, ensure that all people who have recently returned from overseas have cleaned their boots and clothes before entering the orchard. Great care should be taken to prevent the introduction of plant pests into Australia.

Contractors and utility providers

The term 'contractors' includes utility providers, orchard contractors, earth moving companies and research personnel who enter an orchard in their day-to-day operations. As with casual workers, contractors pose a significant risk because of their movement between properties.

Placing biosecurity signs on external property gates can play an important part 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 complete 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 orchard.

Equipment and vehicles

18 Movement of vehicles and machinery

Vehicles and orchard equipment, such as sprayers, tractors and hand tools, can carry pests in adhering soil, sap and plant material. Pests may then be introduced to a previously clean property or crop.

It is impractical to stop all vehicle and equipment movement on and off the property, but using dedicated orchard vehicles, washing down machinery on concrete pads and denying access of dirty machinery can reduce the spread of pests.

Contractors, re-sellers, service providers and drivers of delivery trucks (e.g. nursery stock, fertiliser, etc.) and earth-moving equipment should be requested to clean their vehicles and equipment before entering your orchard. Orchards open to the public (e.g. U-pick businesses) 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 sites are important.



Weedstop

Inspecting and cleaning machinery is more time and cost effective than managing a new pest introduced to your property

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.
- Where possible, use your own vehicle to carry visitors around your orchard.
- In production areas, keep vehicle movement to a minimum, especially on wet soil. Stick to regular pathways through the orchard.
- Hose off and disinfect machinery in a designated wash-down area (see page 19) before moving between properties.
- Ensure contractor equipment is washed down thoroughly to remove any plant material or soil before entering your orchard.
- Always make sure that borrowed and second-hand equipment and machinery is cleaned of all plant material and soil before moving them into your orchard.
- Regularly clean all tools and equipment, including pallets, pallets, cherry pickers, boxes, bags, trimmers and any other equipment used in the orchard, preferably with a disinfectant or bleach solution.

Wash-down facilities

A wash-down facility allows orchard 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 orchard.

A wash-down area should:

- Be readily accessible and located between the driveway and orchard roads.
- Be isolated from production areas.
- Have access to power and high-pressure water.
- Have a sealed (concrete or bitumen) or packed gravel surface.
- 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 as far as practically possible to give access to internal spaces.
- Leave covers off after cleaning to allow inspection.
- Get a second opinion – a fresh look will see contamination you may have missed.

For additional protection, an added detergent-based degreaser or disinfectant (for example, Septone Truckwash®, Castrol Farmcleanse® or Virkon®) may be appropriate. For best results, seek advice from re-sellers on the best product, and remove as much soil and plant material as possible from the equipment before using the disinfectant.

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

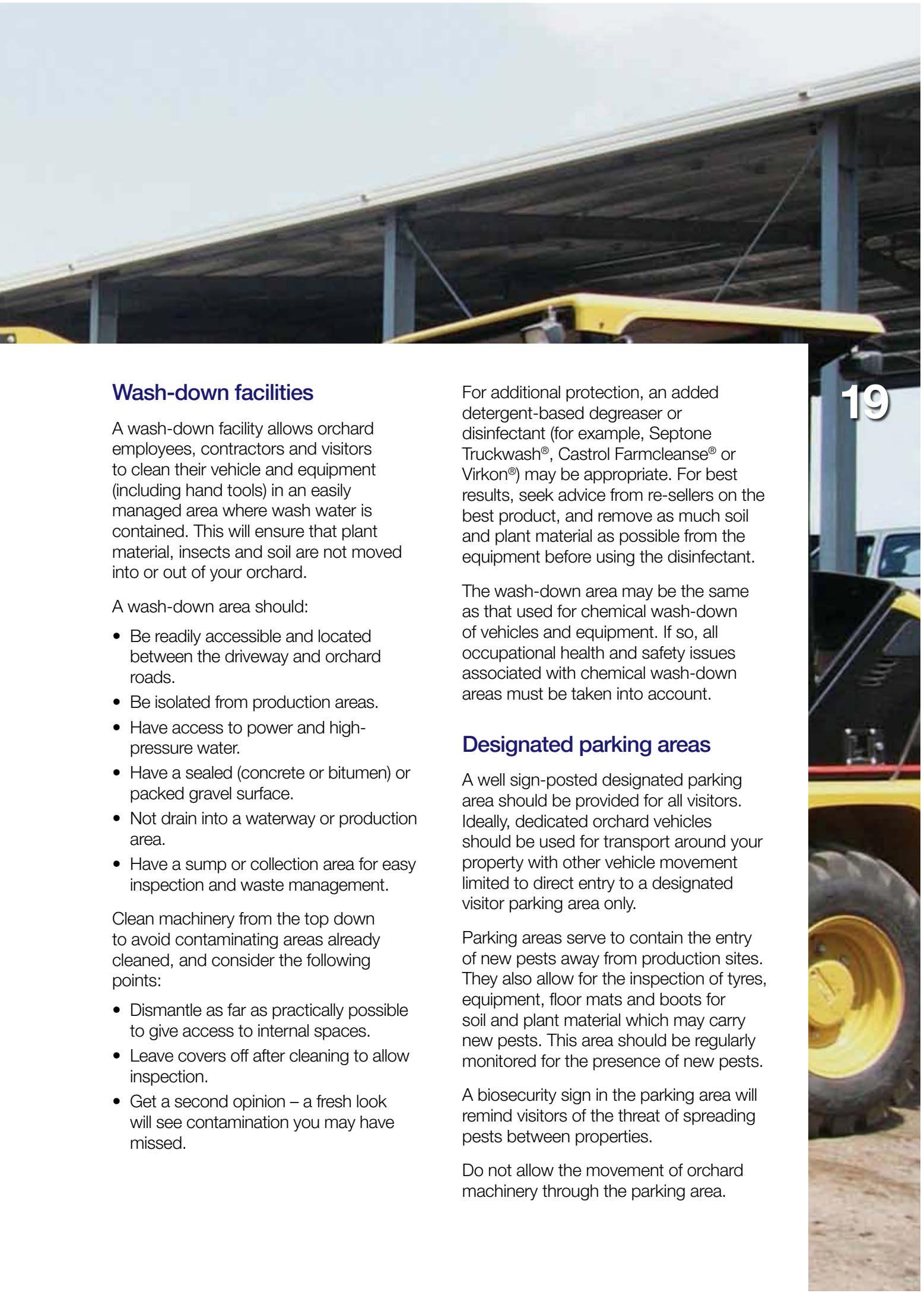
Designated parking areas

A well sign-posted designated parking area should be provided for all visitors. Ideally, dedicated orchard vehicles should be used for transport around your property with other vehicle movement limited to direct entry to a designated visitor parking area only.

Parking areas serve to contain the entry of new pests away from production sites. They also allow for the inspection of tyres, equipment, floor mats and boots for soil and plant material which may carry new pests. This area should be regularly monitored for the presence of new pests.

A biosecurity sign in the parking area will remind visitors of the threat of spreading pests between properties.

Do not allow the movement of orchard machinery through the parking area.



Biosecurity best practice checklist

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To ensure your property has the best protection against the introduction and spread of new pests, identify the strengths and weaknesses of your orchards biosecurity activities through the following self-assessment questions.

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



A. Forbes, PHA

Date of biosecurity check: _____

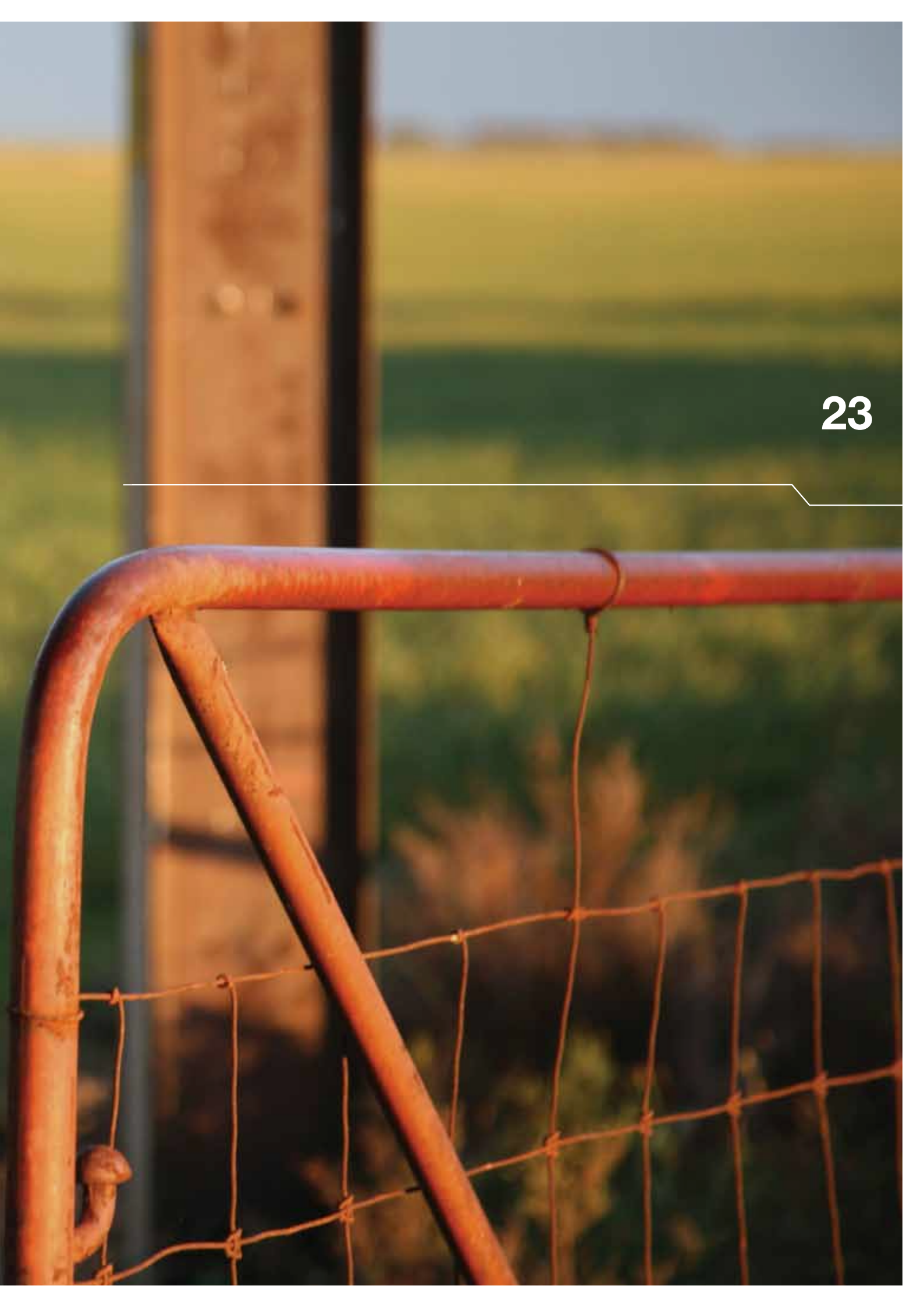
RECOMMENDED PRACTICES	YES	NO	COMMENTS
Pests			
Orchard staff know how and where to report pests			
Pest surveillance regularly conducted, with activities and results recorded even when nothing is found			
Orchard staff are familiar with common established pests and the high priority exotic pests of cherries			
Commercial trees and neighbouring vegetation regularly inspected for pests			
Pest threat posters displayed			
Product management			
Planting or propagation material is 'certified' or has a defined and documented health status			
Propagation material thoroughly checked upon receipt			
Records of planting material and its source are maintained			
Staff are aware of symptoms of cherry pests spread with propagation material			
No soil, plant material or insects left on equipment or bins			
Fruit loaded and unloaded on paved or sealed pad away from production areas			
Fallen or waste fruit, packing shed waste and plant trimmings disposed of away from production areas and irrigation sources			
People movement			
Biosecurity signs with contact details located at main entrance			
Staff trained in biosecurity measures and threats			
All visitors sign a visitor register on arrival			
All visitor and staff clothing, footwear and tools are free of loose soil or plant matter before entering and leaving the orchard			
All people recently returned from overseas are checked to ensure they have clean footwear and clothing before entering orchard			
Footbaths and scrubbing brushes are provided			
Staff understand neighbouring enterprises and their activities			
Equipment and vehicles			
Designated parking area for visitors and contractors equipment available and clearly signed			
Cleaning and wash-down facilities, preferably on a concrete pad, provided for people, machinery and equipment and clearly signposted with instructions			
High pressure water or air available for use to remove plant material and soil from equipment and machinery			
Sump installed in wash-down facility to catch unwanted weeds and stop run-off			
Machinery entering the property inspected for pests, soil and plant material prior to entering production areas			
Borrowed and second-hand machinery and equipment is cleaned and disinfected before use			
Vehicle movement kept to a minimum in production areas			
Root trimming secateurs, budding and grafting knives are disinfected between trees			

Further information

More information on biosecurity, orchard hygiene, pests and the cherry industry can be found through the following sources.

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	Useful contacts	Contact details
ORGANISATION	Cherry Growers Australia	Phone: 03 6231 1229 Website: www.cherrygrowers.org.au
	Plant Health Australia	Phone: 02 6215 7700 Email: biosecurity@phau.com.au Website: www.planthealthaustralia.com.au
	Farm Biosecurity	Phone: 02 6215 7700 Email: info@farmbiosecurity.com.au Website: www.farmbiosecurity.com.au
GOVERNMENT	Australian Government – Department of Agriculture, Fisheries and Forestry (DAFF)	Phone: 02 6272 3933 Website: www.daff.gov.au
	New South Wales – Department of Primary Industries	Phone: 1800 808 095 or 02 6391 3100 Website: www.dpi.nsw.gov.au
	Queensland – Department of Agriculture, Fisheries and Forestry	Phone: 13 25 23 or 07 3404 6999 Website: www.deedi.qld.gov.au
	South Australia – Department of Primary Industries and Regions	Phone: 1300 666 010 or 08 8168 5200 Website: www.pir.sa.gov.au
	Tasmania – Department of Primary Industries, Parks, Water and Environment	Phone: 1300 368 550 Website: www.dpiw.tas.gov.au
	Victoria – Department of Primary Industries	Phone: 13 61 86 or 03 5332 5000 Website: www.dpi.vic.gov.au
	Western Australia – Department of Agriculture and Food	Phone: 08 9368 3333 Website: www.agric.wa.gov.au



Visitor register

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

Date	Time on property		Name	Reason for visit	Vehicle registration and mobile phone	Blocks visited	Location/date of last contact with commercial cherry plants
	Arrival	Departure					

**EXOTIC PLANT PEST HOTLINE
1800 084 881**

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

* An electronic version of this Visitor Register can be downloaded from the Farm Biosecurity website (www.fambiosecurity.com.au)

Pest surveillance data sheet

Orchard: _____

Scout: _____

Date: _____

Block	Endemic pests				Exotic pests			Other pests found	Comments
	No. sites	Pest 1	Pest 2	Pest 3	Pest 4	Pest 1	Pest 2		

**EXOTIC PLANT PEST HOTLINE
1800 084 881**

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

* Estimated infestation level (e.g. zero/low/med/high or % trees affected) of established pests and presence/absence of exotic pests 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.fam biosecurity.com.au)

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 10 for details).

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Year/Season: _____

Crop value			
Area cropped	Total:		
	Breakdown by variety		
	Variety	Location	Area cropped
Yield	Variety	Yield	Comments
Market price	Market location	Variety	Price
			Evidence (e.g. receipts)
Capital items			
Items installed on site (e.g. irrigation lines, harvest bins, protective covers, trellising, etc.)	Item details	Amount	Cost (depreciated)
Tree value			
Stock take of trees	Variety (and commercial life)	Tree age	Number of trees
Tree costs	Trees planted this season		
	Variety	Number	Cost

Stored products			
Products stored	Product/variety	Amount	Time period of storage
Pruning and harvesting costs			
Time	Total staff hours for harvest (including start and finish dates):		
	Total staff hours for pruning (including start and finish dates. If more than one round, list all dates):		
Machinery costs	Cost to run/hire machinery for harvest:		
	Cost to run/hire machinery for pruning:		
Contractor costs	Cost of employing a harvest contractor (if used):		
	Cost of employing a pruning contractor (if used):		
Net profit from season			
Total sales	Value:	Evidence (e.g. receipt):	
Total costs	Value:	Evidence (e.g. receipt):	
Total net profit	Value:	Evidence (e.g. receipt):	

Fact sheet

Plum curculio

What is Plum curculio?

Plum curculio (*Conotrachelus nenuphar*) is an economically damaging weevil that is regarded as the most serious pest of pome and stone fruit after codling moth in eastern North America.

What does it look like?

Adult weevils are about 5 mm long and brown/grey in colour with four pairs of ridges on the forewings (elytra). The weevils' snouts are small, rough and speckled black, gray, and brown. Larvae are curved, legless and 6-9 mm long and are typically white with brown heads. The minute eggs (0.4 x 0.6 mm) are elliptical and white, but aren't visible externally as they are laid in the fruit.

What can it be confused with?

The appearance of the Plum curculio is similar to two other weevil pests that are also not present in Australia, the Apple weevil (*Anthonomus quadrigibbus*) and Apple blossom weevil (*A. pomorum*). Therefore, the detection of any weevil matching this description should be reported.

What should I look for?

Adult weevils cause scarring and oviposition wounds on the fruit, but damage is highly variable. Larval feeding causes internal damage, so the most recognisable symptom of Plum curculio is rotten cherry fruit on the trees with possible fruit drop.

How does it spread?

Larvae can be spread in infested cherries, though a more likely means of spread is through contamination of packing material by adult weevils.



Larvae are white with a brown head

Clemson University – USDA Cooperative Extension Slide Series, Bugwood.org



Adult weevils are brown/grey

Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org



The weevil's snout is small, rough and speckled

Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org





Where is it now?

Plum curculio is currently restricted to North America.

How can I protect my orchard from Plum curculio?

Source planting material and orchard inputs only from 'clean', accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**



Ridges are prominent on the weevil's forewings

E. Levine, Ohio State University, Bugwood.org



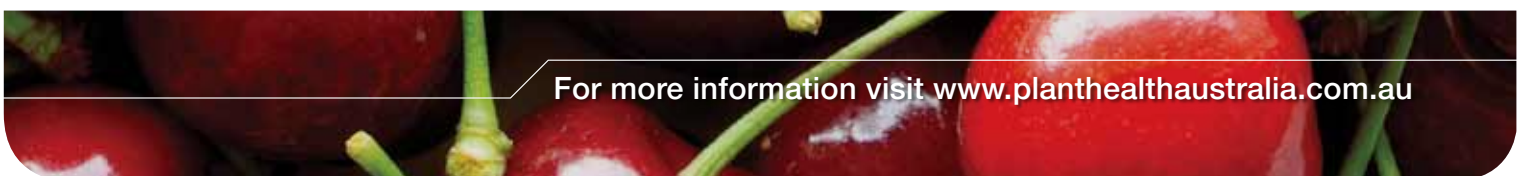
Larvae cause internal fruit rotting

P.J. Chapman, New York State Agricultural Experiment Station, Bugwood.org



Oviposition scars on young fruit

P.J. Chapman, New York State Agricultural Experiment Station, Bugwood.org



For more information visit www.planthealthaustralia.com.au

Fact sheet

Spotted winged drosophila

What is Spotted winged drosophila?

Spotted winged drosophila (SWD, *Drosophila suzukii*) is a newly emerging pest in North America. 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 SWD eggs to lay in healthy fruit include a range of berries, cherries, nectarines, plums and grapes. Apples, pears and other fruit with thicker skins are also hosts when fruit begins to rot.

What does it look like?

Adult SWD are yellow-brown coloured flies with dark bands on the abdomen and red eyes. They are 23 mm in length and the female flies have a serrated ovipositor at the tip of their abdomen. This ovipositor allows the females to lay eggs in healthy, thin-skinned fruit. Males have a small dark spot the front edge near the tip of each forewing (unlike females).

Larvae are cream or white coloured and about 3 mm long. Pupae are red to brown, 2-3 mm in length and cylinder shaped with two small projections on the end.

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.



Larry L. Strand, UC Statewide IPM Program

Larvae feed internally on fruit making them hard to detect



Martin Hauser, California Department of Food and Agriculture

External damage symptoms on cherry fruit



John Davis

Adult male flies have distinct spots on the ends of their wings, which give the species their name





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.

Detection of the 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.

How does it spread?

Adult SWDs 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 SE Asia but have recently become a pest in Japan and USA.

How can I protect my orchard from Spotted winged drosophila?

Source planting material and orchard inputs only from ‘clean’, accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**



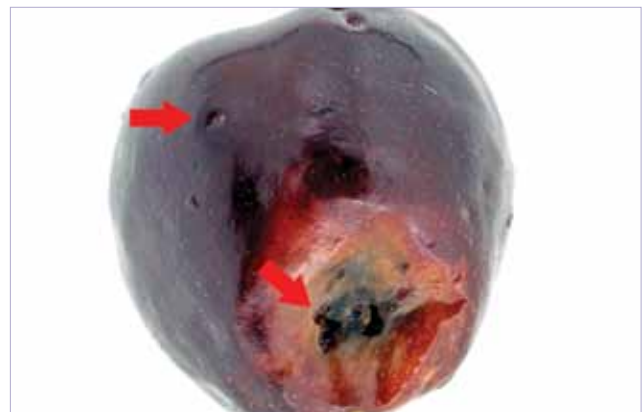
John Davis

Adult females do not have the spots present on their wings



Martin Hauser, California Department of Food and Agriculture

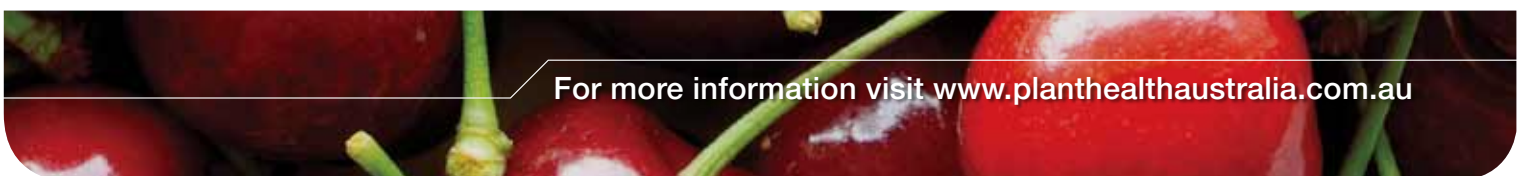
Spotted winged drosophila pupae on damaged fruit surface



Martin Hauser, California Department of Food and Agriculture

Oviposition scars and secondary rotting in cherry fruit

For more information visit www.planthealthaustralia.com.au



Fact sheet

Exotic leaf rollers

What are Exotic leaf rollers?

Exotic leaf rollers include Green headed leaf rollers (GHLR, *Planotortrix* sp.), Oblique-banded leaf rollers (OBLR, *Choristoneura rosaceana*) and Brown headed leaf rollers (BHLR, *Ctenopseustis obliquana*).

What do they look like?

OBLR adults have reddish-brown forewings with strong diagonal bands and a semicircular spot at the wing edge. The moths are 16-30 mm in length, with the females larger than males. Larvae are yellowish-green (though this may vary) with light brown heads.

BHLR adults typically 8-12 mm in length with walnut brown forewings (though this may vary). Both sexes have a dark oblique mark halfway down the edge of each forewing. Males also have a transverse stripe about one-third the distance from head to wingtip. Larvae are green with a black head (first instar) that becomes brown in later instars with possible red stripes on the head in the final instar.

GHLR moths are 7-14 mm in length with forewings darker than hindwings. Male adults have a fan of large scales at the back end of the body. Females often have dark brown, variable zig-zag markings and a dark brown spot on the forewings. At rest the forewings overlap each other to form a bell-shaped outline. Early instar larvae have light green bodies and brown heads that become greener in later instars.

What can they be confused with?

Leaf rolling symptoms on trees are very difficult to distinguish from damage by non-exotic leaf rollers such as the Light brown apple moth.



Oblique-banded leaf roller moths are reddish brown in colour

Cheryl Moorehead, Bugwood.org



Oblique-banded leaf roller larvae are yellowish with light brown heads

USDA Forest Service - Region 8 Archive, Bugwood.org



Adult Green headed leaf roller moths are 7-14mm in length

Donald Hobart, Atlas of Living Australia



What should I look for?

Larvae damage the leaves, fruit and buds. Rolled leaves are the most obvious symptom of leaf roller presence as the larvae feed in webbed terminals and rolled leaves. Fruit may be scarred and ultimately the larvae bore holes in cherries. Failure of current pesticide regimes to control leaf rollers may also suggest the presence of exotic leaf rollers.

How do they spread?

GHLR and BHLR adults can spread locally by flying, but the main means of long distance dispersal is through larvae infested leaves or fruit. OBLR are most likely to be transported as hibernating larvae on dormant nursery stock.

Where is it now?

OBLR are present in North America whilst GHLR and BHLR are only found in New Zealand.

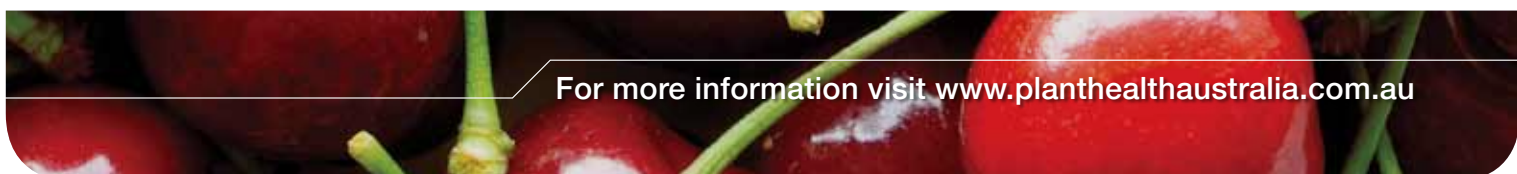
How can I protect my orchard from Exotic leafminers?

Source planting material and orchard inputs only from 'clean', accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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



Fact sheet

Plum pox virus

What is Plum pox virus?

Plum pox (also known as Sharka) is caused by the *Plum pox virus* (*Potyvirus*). It infects many *Prunus* spp., though there may be different strains of the virus that are host specific.

What can it be confused with?

Symptoms vary widely and some may be confused with abiotic stress symptoms such as nutrient deficiency.

What should I look for?

Symptoms depend very much on locality and season and may appear on trunks, leaves or fruits. Symptoms are particularly clear on leaves in spring: chlorotic spots, bands or rings and vein clearing. Trunks can show splitting and fruit may drop off prematurely.

How does it spread?

Spread within orchards or to neighbouring orchards occurs via aphid vectors such as *Aphis spiraecola* and *Myzus persicae*. Long distance dispersal (and the most likely means of entry into Australia) is through importation of propagation material that has been grafted with wood from infected *Prunus* trees.

Where is it now?

Plum pox virus is widespread throughout Europe and was found in Chile in 1992, but has since been eradicated.



Virus symptoms on plum leaves

Biologische Bundesanstalt für Land- und Forstwirtschaft
Archive, Bugwood.org



Vein clearing symptoms in peach leaves

Biologische Bundesanstalt für Land- und Forstwirtschaft
Archive, Bugwood.org



Chlorotic spot symptoms on peach fruit

European and Mediterranean Plant Protection Organization
Archive, Bugwood.org





How can I protect my orchard from Plum pox virus?

Source planting material and orchard inputs only from 'clean', accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**



Internal and external fruit symptoms in apricots, including brownish depressions and grooves on the fruit surface

Ministry of Agriculture and Regional Development
Archive, Bugwood.org



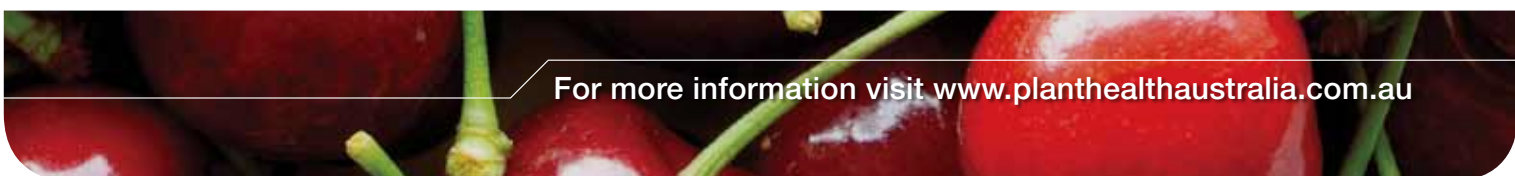
The aphid vector *Myzus persicae*

Scott Bauer, USDA Agricultural Research Service,
Bugwood.org



Severe symptoms exhibited on plum fruit

Biologische Bundesanstalt für Land- und Forstwirtschaft
Archive, Bugwood.org



For more information visit www.planthealthaustralia.com.au

Fact sheet

Apple maggot

What is Apple maggot?

The Apple maggot (*Rhagoletis pomonella*) is one of the most serious fruit fly pests of North America.

What does it look like?

Larvae that cause damage are cream coloured and almost 10 mm in length when fully grown. Pupae are yellow/brown, about 5 mm long and oval shaped.

Adult flies are smaller than house flies (about 5 mm in length with a wingspan of just over 10 mm) with black bodies, yellowish head and legs and greenish eyes. Wings are clear with characteristic black bands and a white spot on the thorax. The abdomen is black with three (males) or four (females) light coloured cross bands.

What can it be confused with?

Apple maggot adults look similar to other small flies, but are recognisable by four irregular or zig-zag black bands on the wings. Symptoms on the fruit are similar to damage from Mediterranean fruit fly or Queensland fruit fly.

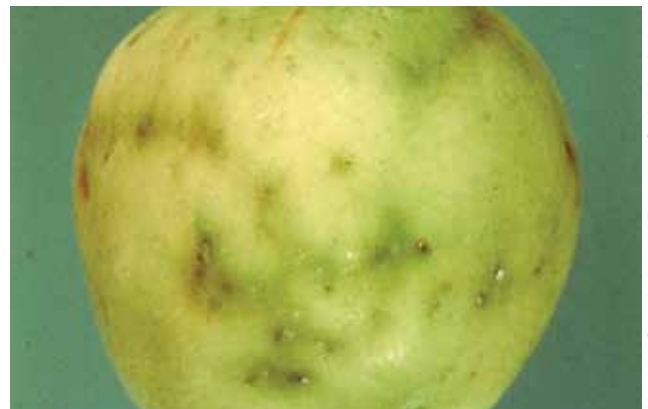
What should I look for?

On the surface of the fruit symptoms include oviposition punctures, sunken dimples (as a result of egg laying in immature fruit) and possible discolouration around oviposition punctures. When fruit is cut open, characteristic brown trails left by larvae can be seen. The honeycombed flesh may eventually break down and apples may drop prematurely.



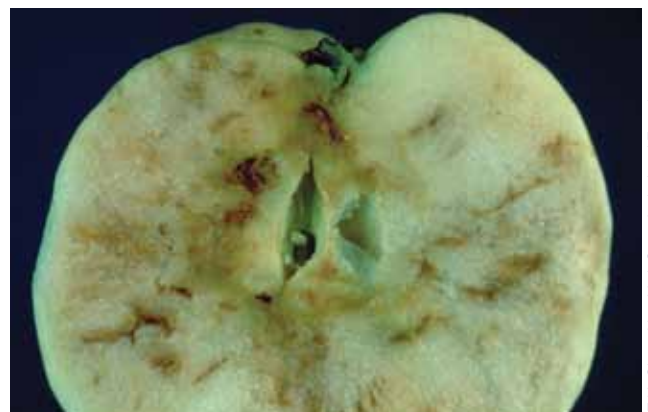
Joseph Berger, Bugwood.org

The Apple maggot can be distinguished by the zigzag pattern on the wings and the pronounced white spot on its back



New York State Agricultural Experiment Station Archive, Cornell University, Bugwood.org

Dimpling of apple fruit surface resulting from infestation



E.H. Glass, New York State Agricultural Experiment Station, Bugwood.org

Internal fruit symptoms of maggot feeding in apples





How does it spread?

Adult flies can spread small distances around the orchard, but longer distance dispersal occurs through movement of contaminated material. Pupae can be transferred in contaminated soil (on machinery or in growing medium where seedlings are involved), whilst eggs and larvae spread widely in contaminated plant material (primarily fruit).

Where is it now?

Apple maggot is widespread in the USA and also has a restricted distribution in Canada and Mexico.

How can I protect my orchard from Apple maggot?

Source planting material and orchard inputs only from 'clean', accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**



Whitney Cramshaw, Colorado State University, Bugwood.org

Monitoring for Apple maggot can be completed using a yellow sticky trap. Any potential signs of Apple maggot on sticky traps in Australia should be reported



Joseph Berger, Bugwood.org

Adult flies are similar to other small fly species, with the exception of the zigzag pattern on the wings and white dot on back



Stephen Luk, Guelph

Apple maggot fly larvae are cream coloured and almost 1 cm long

For more information visit www.planthealthaustralia.com.au

Fact sheet

X disease

What is X disease?

X disease is caused by the X disease phytoplasma and is economically important in North America (particularly California) where it causes serious problems on cherries as part of the peach yellow leaf roll complex.

What can it be confused with?

Symptoms may be confused with abiotic stress symptoms.

What should I look for?

Early symptoms include spotting and rolling of the leaves. Leaf veins may also swell. Shortly after, the whole canopy of the tree becomes chlorotic and its leaves fall, leaving a few rosettes at the tips of the shoots. Young trees die 1-3 years after first symptom appearance. Chronically infected older trees may survive several years but yield little or no fruit. Infected cherry trees on *Prunus mahaleb* rootstocks die rapidly because the rootstock is resistant, and a hypersensitive reaction occurs at the graft union.

Symptoms in fruit include small, pointed or distorted fruit with a pale red to greenish white colour. Peduncles may present as shorter than usual.

How does it spread?

The disease is readily transmitted by budding or grafting, but the phytoplasma itself can be very irregularly distributed in the plant (according to strain). Transmission is also possible to various herbaceous plants which act as reservoirs in orchards. The most important practical form of transmission is by leafhoppers.



F. Dossba, INRA, Bordeaux, Bugwood.org

Early symptoms include leaf yellowing and rolling and swollen veins



H.J. Larsen, Bugwood.org

Canopy chlorosis of an entire sour cherry tree due to X disease



H.J. Larsen, Bugwood.org

Graft union showing symptoms of X disease





Where is it now?

The X disease phytoplasma is widespread in North America and has also been reported from India.

How can I protect my orchard from X disease?

Source planting material and orchard inputs only from 'clean', accredited suppliers. Check your orchard frequently for the presence of new pests and unusual symptoms. Make sure you are familiar with common cherry pests so you can tell if you see something different.

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

**EXOTIC PLANT PEST HOTLINE
1800 084 881**



X disease can affect entire orchards

A. H. Purcell, University of California



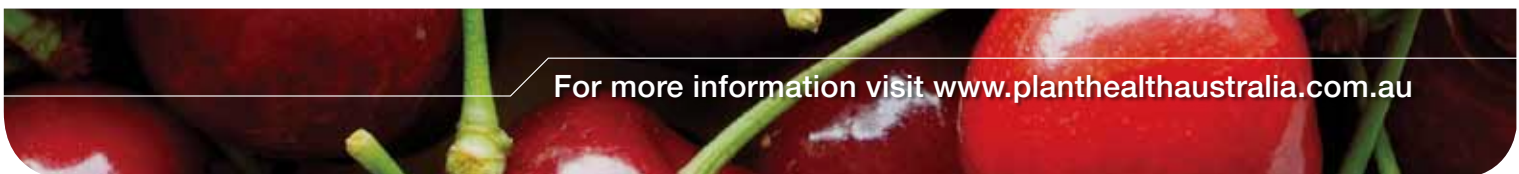
Diseased fruit (right) are paler than normal fruit (left)

J.K. Uyemoto, USDA



Affected fruit are smaller and peduncles are shorter

F. Dostza, INRA, Bordeaux, Bugwood.org



For more information visit www.planthealthaustralia.com.au

Notes



Plant Health Australia

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Level 1, 1 Phipps Close
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Email biosecurity@phau.com.au
www.planthealthaustralia.com.au



EXOTIC PLANT PEST HOTLINE
1800 084 881

