

Cherry Growers' Biosecurity Manual

A guide to farm biosecurity measures to reduce the risks of pests, diseases and weeds impacting your production

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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.

planthealthaustralia.com.au



Cherry Growers Australia (CGA) is a member-based organisation that represents the interests of its member states and orchardists nationally. From cherry growing, harvest, selling and promotion, CGA strives to assist Australian cherry growers by providing access to the best available resources, networks and market information to its more than 500 members across Australia.

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Introduction

If you grow cherries this manual is designed for you and your staff, as well as contractors, researchers and consultants working in the industry. It outlines simple procedures that can be used to minimise the risk of introducing and spreading pests, diseases or weeds on-farm.

You have an important role to play in protecting your farm, your region and the cherry industry from biosecurity threats.

Focus your efforts on the following key points:

- Complete the Biosecurity Checklist (pages 31-37).
- Develop a plan that sets out how you're going to implement actions to address gaps in your biosecurity preparedness.
- Focus on addressing the high risks posed by the movement of people, vehicles and equipment onto and from your farm. Start by reading pages 9-15 (People, vehicles and equipment).
- Download a visitor register from the Cherry Growers Australia website or **farmbiosecurity.com.au** and use it to log visitors who enter your cherry production areas.
- Become familiar with the pests on pages 40-48. You may need to refer to these if you find a pest or disease you don't recognise.
- Report anything unusual without delay on 1800 084 881.

Biosecurity overview

Biosecurity is the management of risks to the economy, the environment and the community, from new pests, diseases and weeds entering, establishing and spreading. By using the recommended measures in day-to-day activities you will improve your farm's biosecurity and that of your region, minimising crop losses and additional costs.

The risk is real

Cherry growers face many types of biosecurity risks:

- Exotic pests and diseases – that are not yet in Australia (pages 40-48).
- Regionalised pests and diseases – that are already in Australia but are restricted to particular regions or can be kept off your farm through biosecurity practices.

On-farm biosecurity practices like those in this manual will help to protect your property from biosecurity risks.

On-farm biosecurity is most effective if all practices are of a high standard and adhered to. Failure to carry out a single practice can potentially lead to the introduction of a new pest or disease.

Exotic pests are those not currently present in Australia. **Established** pests are already within Australia, although some are contained to particular regions.

Working together to protect your enterprise and Australia

While many people think of biosecurity as quarantine restrictions imposed by the Australian Government at international border entry points, there are multiple layers to the biosecurity system and every Australian has a role to play.

The diagram on page 4 shows three parts to the biosecurity system and the activities carried out by many people, including farmers. Protection from pests, diseases and weeds is only possible if everyone works together.

The Australian Government plays a key role pre-border, working with exporting nations to minimise risks before product leaves a country.

Much of the Australian Government's work is at the border, where international movements of people and goods are regulated. These activities aim to prevent entry and establishment of exotic pests and diseases.

Within Australia, post-border biosecurity measures aim to prevent the spread of regionalised weeds, pests and diseases, and to contain and eradicate any new pest that may enter Australia.

Post-border biosecurity relies on the activities of state governments, local governments and everyday Australians.

The roles of every Australian, including cherry growers, are to:

- protect areas within their control from weeds, pests and diseases
- obey the law, particularly those about movement restrictions
- report any sightings of possible exotic pests, weeds or diseases.

In Australia biosecurity involves three layers of protection.

PRE-BORDER



- Analysing pest risks associated with proposed imports
- Inspecting, verifying and auditing overseas exporters
- Undertaking pest surveillance overseas
- Developing international standards
- Building capacity overseas
- Anticipating pest threats by gathering global pest intelligence
- Negotiating export market access
- Maintaining the Manual of Importing Country Requirements (MICoR) and Export Documentation System (EXDOC) to facilitate exports

AT THE BORDER



- Inspecting and monitoring arrivals of people, cargo, mail and plant products
- Raising awareness of plant pests and movement restrictions
- Imposing biosecurity measures at ports
- Encouraging the reporting of suspected new pests by port workers and importers
- Protecting Australia's north from exotic pests with the Northern Australia Quarantine Strategy (NAQS)
- Enforcing border restrictions
- Isolating newly arrived plant material in post-entry quarantine
- Prioritising exotic pests to target with preparedness and prevention activities

POST-BORDER



- Preventing spread of regionalised pests
- Providing early warning of incursions of exotic pests with surveillance
- Eradicating exotic pests under the Emergency Plant Pest Response Deed
- Managing risks under the control of everyday Australians
- Encouraging the reporting of anything unusual
- Managing established pests
- Maintaining the ability to diagnose plant pests
- Maintaining emergency response capacity
- Responding to environmental threats with the National Environmental Biosecurity Response Agreement
- Protecting farms with on-farm biosecurity measures
- Managing pest fruit flies on a national basis
- Managing weeds

What is biosecurity?

Biosecurity is the protection of your property and the entire industry from the entry, establishment and impact of pests and diseases. Biosecurity measures implemented in orchards 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 measures allow us to preserve existing trade opportunities and provide evidence to support new market negotiations.

What is orchard biosecurity?

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

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.



Why orchard biosecurity matters

Orchard biosecurity practices help to protect your livelihood from established insect pests, diseases and weeds and, in the event of new pest entry into Australia, from exotic pests.

These practices make good business sense since every additional pest can reduce yield and increase production costs. In the case of bacterial canker (page 23), biosecurity practices can limit the spread of this disease which is already in Australia.

Biosecurity is also crucial for protecting access to markets, especially export markets. The presence of pests, diseases and weeds can mean that certain markets will not be willing to receive products grown in particular regions. These markets might also be interstate buyers in regions that are free from the threat.

Maintaining a favourable pest status in your region underpins the future profitability and sustainability of the Australian cherry industry.

In addition to being best practice, state legislation is changing to make it a legal requirement that everyone, including cherry growers, reduce risks under their control. See page 6 for information on laws already in force in Queensland and NSW. Tasmania is in the process of updating its biosecurity legislation, and other states and territories are expected to follow suit.

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.

Regional cooperation on biosecurity

Biosecurity at the regional level is strengthened through community engagement.

Weeds, pests and diseases can spread to your property from neighbouring areas, so it makes sense to work with others on regional approaches to pest management wherever possible.

Pests, diseases and weeds can be harboured in the backyards of towns near where cherries and other crops of *Prunus* species are grown. Other nearby properties may also pose a risk, especially abandoned or neglected farms. Sometimes native vegetation can also host pests and diseases.

Through a collaborative approach, biosecurity threats to all properties in your region can be minimised.

To strengthen the biosecurity measures used on your property, consider including biosecurity issues and activities in community or regional meetings.

It pays to contact others in your area to develop a shared understanding of local threats and local expertise or resources that can help.

Locals have a unique understanding of the region's vulnerability, the source and nature of threats, and the expertise and resources available to the region.

You can contribute by implementing biosecurity measures, and by monitoring for and reporting suspect pests.



Image courtesy of Fruit Growers Tasmania

Biosecurity at the regional level is strengthened through community engagement.

Biosecurity laws

Everyone has a role to play in safeguarding Australia from weeds, pests and diseases. All states have legislation for biosecurity management which include requirements for reporting new pests and diseases. Cherry growers in NSW or Queensland have particular duties and obligations.

New South Wales: the general biosecurity duty

The NSW *Biosecurity Act 2015* supports the principle that biosecurity is a shared responsibility between government, industry and the community.

The inclusion of a general biosecurity duty in the legislation means that any person who deals with a biosecurity matter and who knows, or ought to know, about the biosecurity risk has a responsibility to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

The new legislation came into effect on 1 July 2017. Further information can be obtained from the NSW Department of Primary Industries: dpi.nsw.gov.au/about-us/legislation/list/biosecurity-act-2015

Queensland: the general biosecurity obligation

The Queensland *Biosecurity Act 2014* came into effect on 1 July 2016. Under the Act, everyone needs to take an active role in managing biosecurity risks that are within their control.

The general biosecurity obligation in the Act means that everyone must take all reasonable steps to ensure that they do not spread pests, diseases, weed seeds or contaminants. Everyone therefore has a responsibility to report unusual events that might be related to biosecurity.

You are not expected to know everything about all biosecurity risks, but you are expected to know about risks associated with your work or day-to-day activities.

For example, farmers are expected to be aware of the pests and diseases that affect their crops and manage them appropriately, including reporting unusual symptoms or pests.

Further information is available from the Queensland Department of Agriculture and Fisheries: daf.qld.gov.au/business-priorities/biosecurity/policy-legislation-regulation/biosecurity-act-2014

GENERAL BIOSECURITY DUTY

WHAT IS MY DUTY?

- Prevent Biosecurity Risks
- Eliminate Risks
- Minimise Risks

As much as is reasonable

WHEN DO I HAVE A DUTY?

If you deal with, or deal with a carrier of biosecurity matter you have a duty

e.g. weeds, animals, plants or machinery...

And if you should know that there is a risk

HOW DO I FULFILL MY DUTY?

By referring to:

- State Strategic Plans
- Regional Strategies
- Local Plans
- Guidelines & Advisory Material
- Codes of Practice & Industry Standards
- Mandatory Measures

How will the General Biosecurity Duty apply to me?

You are not expected to know about all biosecurity risks, but you are expected to know about risks associated with your industry, business, day-to-day work and your hobbies.

New biosecurity laws for Queensland

Biosecurity is the protection of the economy, the environment and the community from animal and plant pests, diseases and contaminants. It is critical to market access and the profitability and sustainability of our industries. It also safeguards Queensland's natural assets, our health and our way of life.

The *Biosecurity Act 2014* (the Act) came into effect on 1 July 2016. This brochure outlines how this new Act will affect you.

Why change Queensland's biosecurity laws?

Queensland's former biosecurity legislation consisted of many different Acts that were developed independently over the past hundred years. Because of this, there were many inconsistencies as well as laws that were not flexible enough to meet the challenges of today's biosecurity environment.

Queensland is facing more biosecurity threats more often. Global travel, trade in animal and plant products, and diversity of land use—all of which increase biosecurity risk—contribute to this. Also, Queensland's environmental diversity and climatic conditions favour the establishment of many exotic pests and diseases, so we can expect more biosecurity incursions than any other state in Australia. To cope, we need more flexible and responsive laws.

The new Act will improve Queensland's biosecurity.

What has changed?

The new Act replaced a lot of legislation you might be familiar with. Importantly, the Act allows a consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland.

The Queensland Government will continue to take immediate action to manage biosecurity risks. In fact, under the new Act, action can be taken if there is a reasonable belief that a serious risk exists, without having to wait for scientific confirmation.

The Act deals with pests (such as wild dogs and weeds), diseases (such as foot and mouth disease) and contaminants (such as herb on grazing land).

Decisions made under the Act depend on the likelihood and consequences of the risk. This will mean risks are managed more appropriately.

All Queenslanders need to take an active role in managing biosecurity risks under their control. Under the Act, individuals and organisations whose activities pose a biosecurity risk have greater legal responsibility for managing them. This **general biosecurity obligation** means they must take all reasonable steps to ensure they do not spread a pest, disease or contaminant.

Queenslanders need to report unusual events that might be related to biosecurity, for example abnormally high mortality or morbidity rates in animals and sudden, unexplained falls.

Every cherry growers' responsibility

The following pages suggest ways to reduce the vulnerability of your enterprise to biosecurity threats. Every farm is different, so the general principles described here will need to be tailored to your needs.

It is useful to start with a map of your property to consider risk areas, and the best places to locate biosecurity zones and checkpoints.

This could include signs at entrances to the property, parking areas near the house or site office, the location of deliveries and pick-ups in relation to storage facilities, vehicle washdown areas, and existing roads or tracks for movement within the property. Think about what you can do to minimise the risk of introducing diseases, pests and weed seeds at each point.

The priority should be to minimise the biosecurity risks to the production areas.

On pages 31-37 there is a Biosecurity Checklist that will help you to assess the strengths and weaknesses of your current arrangements and plan improvements.

The checklist provides three levels of biosecurity activities – baseline, industry standard and above industry standard – to allow for continual improvement in practices. Any legal requirements are also stipulated.

The practices you choose may vary from orchard to orchard, or even block to block, depending on factors such as the size and location of your property, the facilities available, and the risks that need to be addressed.

Limit access to areas that you know are clean to stop them becoming infected.

Apply rules for the movement of people, vehicles and equipment within production areas that you know are infected to stop further spread of pests or weeds.

The pests of greatest concern to cherry growers are described at the back of this manual, beginning on page 40. Each pest summary indicates how the pest or disease threat can be managed through biosecurity practices.

The biosecurity essentials

When thinking about implementing biosecurity measures on farm, the six biosecurity essentials are a good place to start. They are:

1. People, vehicles and equipment
2. Farm inputs
3. Production practices
4. Farm outputs
5. Feral animals and weeds
6. Train, plan and record

The Farm Biosecurity website has a series of short videos on the six biosecurity essentials that show how easy it can be to implement simple but effective biosecurity measures on your farm.

Go to farmbiosecurity.com.au/videos



Farm biosecurity practices

This section outlines the recommended biosecurity practices for all cherry growers.

Every farm is different. Assess the strengths and weaknesses of your current arrangements using the Biosecurity Checklist on pages 31-37.



People, vehicles and equipment

People, vehicles and equipment can carry diseases, insects and weed seeds onto and around your farm.

Inform visitors of your biosecurity requirements

Make sure that staff, regular visitors, and anyone else entering your property knows about your biosecurity requirements.

Signs at the main entrance to your property alert visitors to the need to comply with the measures you have in place. Other signs can show visitors where to park and where to clean their vehicle or equipment, if needed.

Biosecurity signs help to control movement onto and around your property. Signs can be obtained by contacting Cherry Growers Australia, or you can download the pdf file from farmbiosecurity.com.au/toolkit and arrange for it to be printed locally.

Consider erecting signs in another language if regular visitors are speakers of languages other than English. Khmer and Vietnamese signs can be obtained from farmbiosecurity.com.au/toolkit

When new staff or groups of people arrive, hold an induction session to explain biosecurity measures in place on your farm. This could include workplace health and safety as well as biosecurity requirements, including specific details about the areas of the farm they will access.

Make sure workers know about any biosecurity risks in the region or issues on the property. They should also be familiar with pests commonly found on the property and know how to report anything unusual.

If you hold events on your farm, such as field days, equipment demonstrations or research trials, clearly indicate any entry requirements and be especially vigilant in checking for new pests and diseases afterwards.

Truck drivers may not be aware of the risks associated with their load or with the movement of their vehicles into different areas. Signage and registers can help everyone to be more informed about the risks.

Control access

Controlling and limiting access to production areas such as orchards is the best way to minimise biosecurity risks from the movement of people.

Visitors include farm contractors, consultants or agronomists, backpackers, employees of utility providers and research personnel. Busloads of visitors such as grower groups or students might also require special precautions.

Ideally, there should be only one access point to the property. This makes it easier for you to monitor and control the movement of people. Boundary fencing and gates are recommended to help control access.

Providing a designated parking area away from production areas and asking all visitors to let you know when they arrive will also help you to manage who is coming onto your property.

Ask people to stay on paths and designated roadways as much as possible when moving around the farm.

Assess the risks that each visitor poses. Get into the habit of asking visitors where they have been recently and take actions appropriate to the risk, as explained on the following pages.

Take particular care with high risk visitors – anyone who has recently arrived from overseas, particularly from rural areas, people who have travelled from another cherry farm, and any visitor who moves from farm-to-farm and region-to-region.

If you cannot reduce the risk presented by a visitor by implementing some of the suggestions outlined in this manual, you can refuse access to your property.



Farm zoning

Zoning is the division of your farm into separate areas based on the level of biosecurity that is needed to minimise the possibility of pests and diseases from coming onto and moving around your property. Generally, three zones are required to limit access according to the risk status of the area. In order of increasing level of biosecurity measures they are access, separation and farming (or production) zones.

Every farm is different, so the general principles described here will need to be tailored to your needs. It is useful to start with a map of your property to consider risk areas, and the best places to locate biosecurity zones and checkpoints.

Movement should be restricted between zones where possible.

Where one zone meets the next – e.g. where a separation zone joins a production zone – there is a transition from one level of biosecurity to another. Transition areas should be marked by physical barriers such as fencing and signage. This could include signs at entrances to the property, parking areas near the house or site office, the location of deliveries and pick-ups in relation to storage facilities, vehicle wash-down areas, and existing roads or tracks for movement within the property. Think about what you can do to minimise the risk of introducing diseases, pests and weed seeds at each point.

The practices you choose may vary from paddock to paddock, or even block to block, depending on factors such as the size and location of your property, the facilities available, and the risks that need to be addressed.

Priority should be given to activities that minimise risks to your production areas.

Within your property, limit access to areas known to be free from pests and weeds to stop them from also becoming affected. In particular, apply rules for vehicle and equipment movements in production areas known to be infected to stop further spread.

Sheds where deliveries are received or where product washing and packing occurs might require more thought, because part of both the separation and farming zone will extend into this area. This means that knowing where to draw the line between zones may not be obvious.

Managing waste from wash down and decontamination is also a key consideration. Vehicle and equipment wash down areas should drain away from clean zones and growing areas. It's best to have a hard surface for the wash down and a sump to collect water run-off.

Cost is a key factor in determining what measures you may put in place. It's best to assess all risks before acting to ensure that you are targeting the areas of highest impact.

It's also important to inform relevant service providers, e.g. crop consultants and key logistics providers, of any changes you may be making that will affect them, and to give them time to adjust to your new requirements.

A key element of zoning is that it creates a biosecurity system that is layered. By having a layered approach to biosecurity, it spreads the biosecurity risk across a range of measures, since no single biosecurity practice is 100 per cent effective.

U-pick orchards

Also consider how to manage people who come on farm to pick their own fruit or to buy produce. Having a segregated area away from your main production area is one way to manage the risks posed. Signs can point people in the right direction and prevent them from straying into production areas, and footbaths could be located at the entry to the orchard to minimise risks.

Sentinel plants – varieties that are more susceptible to disease or close to high traffic areas frequented by visitors – can be checked regularly to give an early indication of pest or disease problems.



Consider how to manage people who come on farm to pick their own fruit or to buy produce.



This map shows the relative positions of some facilities found on a farm in relation to the best place to put features like signs, parking or washdown areas. Green represents access zones, grey or white represents separation zones and pink represents the farming (production) zone.

Access zone: The access zone allows for visitor, staff and delivery access to the property and office. People can come and go, and there is no need to clean their vehicles because they are parked in designated areas near the farm entrance, office or house.

Separation zone: This zone is the roadway for essential vehicles that need to come on-farm. This could include trucks picking up produce, fertiliser or fuel deliveries. Separation zones might include the tracks and pathways for essential vehicles to access different areas on-farm.

You can also have separation zones between blocks or areas within a block where different crops are grown to help manage the potential spread of pests between growing areas.

Farming (production) zone: This zone is where farm employees, vehicles, machinery, and equipment operate. People, vehicles, machinery or tools should not enter or exit this area without appropriate measures being used.

Clean boots and clothes

Since weed seeds and pathogens like fungi (e.g. brown rot and European canker, see pages 45 and 47 respectively) can enter on people's footwear and clothing, it helps to have a policy of clean clothes and boots for employees and visitors.

Boots present more of a risk than clothes because they have direct contact with the soil. Provide hot soapy water, scrubbing brushes and disinfectant for people arriving with muddy boots, or give them boots or boot covers to wear while in your production areas. People should also use a footbath when leaving your property.

People who have recently returned from overseas pose an increased potential risk, particularly if they have been in regions where cherries are grown and exotic pests are present. Make sure that they have clean footwear and clothes before entering your farm.

Additional protective measures may be required in areas contaminated with pests or diseases to limit further spread. Provide hygiene supplies such as hand sanitiser, gloves, disinfectant foot scrubbers, disposable over boots and overalls for use where appropriate.

Foot baths are a simple way to manage biosecurity risks associated with soil-borne pests and weed seeds being carried in dirt and mud. Footbaths need to be maintained well to be effective. See farmbiosecurity.com.au/biosecurity-basics-make-your-own-footbath



Use signs to direct visitors to designated parking or reception areas. Access to production fields should be limited to a restricted range of personnel only.

Use a visitor register

It is good practice to maintain a register of people who have been in contact with your production areas, including where they have come from, and where they are going after they leave. This can serve as a health and safety function, and potentially improve on-farm biosecurity.

Visitor or contractor records are useful tools in the event of a new pest entering Australia or a new region within Australia because they can allow investigators to trace the origin and spread of a pest or disease.

A visitor register template can be obtained from farmbiosecurity.com.au/toolkit or cherrygrowers.org.au/biosecurity

If your crop consultant has visited 10 other properties before arriving on yours, what might their boots and tyres be bringing to your farm?

The person who reads the water meter on your irrigation system could be a significant risk to your business if they don't undertake appropriate clean down activities prior to coming onto your property.



Foot brushes and baths are a simple way to manage biosecurity risks associated with soil-borne pests and weed seeds being carried in dirt and mud.

Limit vehicle movements in production areas

It is often impractical to stop all movements of vehicles onto and around the property, but there are steps you can take to minimise the risks that they pose.

Best practice is to make sure that all vehicles are either restricted to a designated parking area or cleaned before entering production areas. Having a parking area on the property allows you to inspect a vehicle and decide what, if any, action you need to take. Get into the habit of doing a quick and simple risk assessment for vehicles and equipment by asking the operator where they have been recently.

Establish three zones around your farm – access, separation and farming – and limit access according to the risk status of the area. In particular, apply rules for vehicle and equipment movement in production areas.

Wherever possible, use dedicated farm vehicles to move through production areas. A dedicated farm vehicle should stay on farm, to minimise the risk of bringing a pest back with it if it leaves the property. Otherwise provide a washdown facility to clean vehicles before allowing access to production areas.

Non-production vehicles should stay on designated roadways as much as possible when moving around the farm.



Without signage, visitors and staff may be unaware of the biosecurity procedures enforced on your property.

Any equipment that moves from farm-to-farm and region-to-region and accesses your production areas is an increased biosecurity risk to your property. This could include harvesters and contract sprayers.

Any machinery coming onto your property poses a risk of spreading pests and weed seeds. This is particularly the case with contractors involved in harvesting, planting or fertilising who have travelled from other farms where cherries are grown.

If sales people want to demonstrate machinery on your farm it is essential that the machinery is washed down and disinfected before it arrives on farm as this type of scenario poses significant risks.

You have the right to ask contractors to clean machinery before entering (and leaving) your farm.

Another alternative is to only engage contractors who are signatories to an industry recommended hygiene protocol or program.

To ensure that your property does not become the source of new pests for others, you have a responsibility to inform visitors of any declared or notifiable pests present on your farm, so that they can take steps to avoid transferring them to the next property.



Pests, disease causing organisms and weed seeds can be present on hands, clothing, footwear and personal items.

Establish wash down and disinfecting facilities for vehicles and equipment

If it's not possible to keep all external vehicles and equipment out of production areas – e.g. netting, trellising and shade cloth installers, pollination service providers – all vehicles and equipment should be cleaned using high pressure water and a detergent or degreaser (speak to your consultant or chemical reseller to find one that's right for you) or compressed air.

Locate a wash down area between the driveway and farm roads, and away from production areas. A sealed concrete or bitumen surface with a sump underneath to collect waste water and debris is ideal. A pad of packed gravel also works well as long as mud, soil and plant material are kept away from crops, storage areas and waterways.

Inspect the area around the wash down facility regularly for the presence of pests or weeds and treat or report as required.

The wash down area may be the same as that used for wash down of chemical spray equipment since both require a separate waste water holding pond. If so, all occupational health and safety issues associated with chemical wash down areas must be taken into account.

Washing all planting and harvesting equipment with a detergent or degreaser such as Bio-Cleanse™ and water, and then disinfecting with a product such as Sporekill™ or Virkon™ will provide additional protection from cherry diseases.

95 per cent of the job of washing a vehicle to decrease the biosecurity risk is in getting the mud off. A disinfectant or sanitiser then finishes the job.

Washing down your tractor and sprayer regularly also keeps dust from building up and caking onto electronics, keeps mud off the roads, and decreases the risk of spreading pests and diseases of cherries.

Wash down bay designs

In the wake of the entry of Panama disease tropical race 4, (a non-eradicable disease of bananas) in Northern Queensland in 2016, Biosecurity Queensland's Panama TR4 Program developed some new wash down bay designs for growers.

The designs are ideal for use by cherry growers since Panama TR4 is a soil borne disease, as is brown rot of cherries (page 45).

For more information go to farmbiosecurity.com.au/wp-content/uploads/Wash-down-designs-for-TR4.pdf

Automatic wash down areas are both easy and efficient systems to use. Costs are higher with these systems than non-automated ones, but improved protection from soil-borne diseases may be had (if designed and maintained well) due to greater contact of water with the underside of the vehicle.

The wash down facility illustrated below is designed for vehicles with a medium to high level of soil and plant contamination. Vehicles are submerged up to the axles and some of the underbody, and a high pressure hose is provided to wash other parts of the vehicle or machinery as required.

This type of wash down bay can be used for all vehicles and machinery entering the property, so it needs to be wide enough for a B-Double to pass through.

Use a disinfectant solution that kills the bacterial or fungal pests you're trying to keep off your farm, but that is also safe for regular use on your vehicle and machinery. Speak to your crop consultant or agricultural supplier to find a suitable product.



Used with permission, from Wash-down designs to combat Panama disease tropical race 4, Queensland Department of Agriculture and Fisheries, 2017

An automatic vehicle wash down bay provides protection against soil-borne diseases.

Cleaning vehicles and equipment

Some suggestions about how to thoroughly wash and disinfect three types of equipment used in your orchard are described below. No risk can be completely removed, but most risks can be reduced by thorough washing and disinfecting.

Pruning equipment

1. Make up a bleach solution that is 1% active sodium hypochlorite or use a product such as Virkon™ according to the label.
2. Regularly dip pruning equipment into the solution.
3. Between rows or trees, use a stiff bristle brush and the solution.



Bins and crates

1. At the start of each season, set bins and crates out in an area where wash down water will not run off into production areas.
2. Use high pressure water to clean crates and bins inside and out, followed by a disinfectant to ensure freedom from plant material.
3. Ensure all crates and bins entering your property are cleaned before use.



Vehicles and trailers

Automatic washing facilities like those mentioned on page 14 are not practical to implement for most cherry growers and a manual wash down can be as effective.

1. Speak to your agricultural chemical supplier about a suitable detergent and disinfectant to manage risks in your area but won't strip the paint on your vehicle.
2. Park your vehicle and or/trailer on a hard gravel surface (such as chemical wash down pad) which drains away from production areas.
3. Use high pressure water and a detergent first, then spray a disinfectant onto the vehicle and trailer, depending on the pest risk.



For more information about disinfectants registered for use in Australia you can search PubCRIS, the APVMA's Public Chemical Registration Information System. Go to portal.apvma.gov.au/pubcris, search using 'disinfectant' as the search term, and scroll down to see the results.

If you click on 'Export CSV' at the top right of the list of products, an Excel spreadsheet will be downloaded which includes information about recommended uses for the product. Alternatively, if you click on the 'View details' tab, and then then 'Host/pest' tab you'll see the product uses. For example, you will know if the product is for use on vehicles, or hard surfaces, hands, irrigation equipment, footwear and so on.

Farm inputs

Anything moved onto your property can be a potential source of weeds, pests and diseases.

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 always visually assess the health of your planting material. Infected material may not show signs of disease, such as on dormant wood and bare roots. Crown gall (*Agrobacterium tumerogenicum*) is one such example.

Never use poor quality or diseased propagation material as it has the potential to infect your entire crop.

To minimise the risk:

- Purchase plant material only from a nursery that takes biosecurity, hygiene, health testing and record keeping seriously.
- 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, such as BioSecure HACCP, or certification status of the nursery itself and the planting material provided.
- 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 the date planted.

Monitor the sources of everything that comes onto your farm including deliveries and water, as these can also bring weeds, pests and diseases.



Obtain clean planting and propagation material from nurseries that will provide records of the material source and testing history.

Check water sources regularly

Dams, rivers and channels have the potential to be reservoirs and conduits for weed seeds and diseases, including European canker (page 47).

Monitor the quality of water used for irrigation and the vegetation along the edges of water courses and dams. This can provide early warning of new weeds, pests and diseases brought on to the farm in water. It can also reveal increased pest pressure on crops due to a build-up of insects or diseases in or near a water course.

If an outbreak of a water-borne disease has been recorded on nearby properties, other measures can be considered. For example, testing by a state department plant health diagnostic laboratory is advised.

More care is needed where water that drains from an orchard into a dam is recycled back onto the crop. Additional measures may be needed to treat the water in the event of a disease outbreak on your farm or a neighbouring farm.

On-farm biosecurity is not necessarily expensive or difficult. Often, reducing the risk is a simple matter of adjusting the way that production activities are done.

Protect water sources from contamination as much as possible by knowing where the inflows to your irrigation water stores are. Consider treating water which has flowed off a potentially contaminated cherry crop or aerating stagnant bodies of water such as dams to prevent outbreaks of blue-green algae.



Many pest and disease-causing organisms can survive for a long time in water sources until they find a suitable host.

Use certified fertiliser

Fertilisers are another input that can potentially introduce diseases, pests and weeds to your farm when applied to a crop. In particular, organic fertilisers such as manure and compost can also be a source of weed seeds.

Reduce the risk of purchasing contaminated or non-compliant fertiliser by ensuring that the supplier is following the Fertilizer Industry Federation of Australia (FIFA) Purchasing Code of Practice or has equivalent quality controls in place. See fertilizer.org.au for more information.

Look for compliance with the Australian Standard AS4454-2012 that applies to compost, soil conditioners and mulches.

It is best practice to ask suppliers of compost for a testing history or other assurance of quality.

When batches are used on-farm, keep a record of the source and where it was applied. Check the area for signs of new pests, diseases or weeds.

If you make your own compost, don't include source material that you know comes from diseased plants. It is also important to monitor the temperature and make sure that thresholds for pest destruction are achieved at all points in the pile of composting material.



Organic fertilisers such as manure and compost can be a source of weeds if not composted thoroughly.

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 1000/2000, NIASA or Freshcare), it is likely that some fundamental aspects of biosecurity are already being applied.

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

Auditable quality assurance schemes (and membership to them) is beneficial in terms of biosecurity, market access, meeting specifications and customer expectations and food safety.

Hive biosecurity

If you're a cherry grower who contracts pollination services for your orchard, bees and hives are a biosecurity risk to your farm. Hive biosecurity practices provide benefits to beekeepers and protect the pollination of crops.

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

The biggest threat is considered to be *Varroa* mite (*Varroa destructor* and *V. jacobsoni*, which are carried on European and Asian honey bees, respectively) and are present in countries to the immediate north (Papua New Guinea) and east of Australia (New Zealand).

Varroa mites feed on both adult and brood bees, 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.

An endemic pest that can cause significant hive losses for beekeepers is American foulbrood, which is reportable in all states and territories of Australia. Signs of American foulbrood include dark sunken or perforated caps and dead larvae which rope out of cells. If it is found in a colony, the infected bees must be euthanised, and the hive destroyed by burning, treated with hot wax or irradiated before new bees can be introduced.

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.

If you are using the services of a beekeeper, you can ask if they are complying with the Australian Honey Bee Industry Biosecurity Code of Practice. It can be useful to draw up a contract with the beekeeper, agreeing on the number and placement of hives, and your responsibilities while the bees are working in the orchard. You can also ask the beekeeper to open up the hives so that you can inspect the bees to ensure that you are receiving a healthy colony.

For more information about the Code of Practice, example pollination contracts and pests of bees, go to the BeeAware website beeaware.org.au.

If you see any unusual signs of pests on bees call the apiarist and the Exotic Plant Pest Hotline on 1800 084 881.

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881



Image courtesy of Charlotte Brunt

Hive biosecurity practices provide benefits to beekeepers and protect the pollination of crops.

The Emergency Plant Pest Response Deed

The Emergency Plant Pest Response Deed (EPPRD) is the formal, legally binding agreement between Plant Health Australia (PHA), the Australian Government, all state and territory governments, and plant industry signatories. It sets out how pest incursions are handled in Australia, and how the cost of a response is shared between industry and governments.

Having signed the EPPRD, Cherry Growers Australia (as the prescribed peak industry body for the Australian cherry industry) has a seat at the decision making table in the event of an emergency plant pest incursion.

If a response plan is agreed by the signatories to the EPPRD, Cherry Growers Australia will have a say in what happens. The industry may also have to contribute funds to implement an approved response plan.

Also under the EPPRD, cherry growers have a responsibility to report suspect plant pests. This is because 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.

More information on the EPPRD is at planthealthaustralia.com.au/epprd

Owner Reimbursement Costs

An underlying principle of the EPPRD is that growers are not better or worse off as a result of reporting an emergency plant pest.

The agreement allows for payments to growers, known as 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 as a result of the destruction of crops, enforced fallow periods, replacement of crops and additional chemical treatments.

Calculation of ORCs is prescribed in the EPPRD, with different formulae being used depending on the type of crop grown, and a specific formula is being developed for cherries. For more information, see planthealthaustralia.com.au/orcs

It is important to remember that ORCs only apply to approved response plans aimed at eradication, which is more likely to occur if a pest is found and reported early.

There is a template to record production values in the back of this manual (page 50) which may be required if ORCs ever needed to be calculated for your property. Electronic copies are available from the Farm Biosecurity website (farmbiosecurity.com.au/profiler). The cherry ORC framework is available from planthealthaustralia.com.au/orcs



Production practices

You can reduce the risk of spreading pests and diseases by including simple biosecurity measures as part of your everyday farm management practices.

Monitor crops for pests and diseases

Monitoring your crops provides the best protection against new pests, diseases and weeds.

Monitoring the health of your crop is a fundamental part of farm management and gives the best chance of spotting a new pest soon after it arrives. You, your employees, contractors or consultants should be looking for established and exotic pests on your farm on a regular basis.

Pay particular attention to high risk areas where pests are most likely to enter and establish.

Loading areas (sidings or pads), near wash down or parking areas and the edge of roads should be monitored for signs of new weeds and treated before they have a chance to grow and produce seed.

Any unusual pests or disease symptoms should be reported on 1800 084 881.

Monitor neglected farms

Neglected farms potentially pose a high biosecurity risk to the cherry industry, as they may allow pests to multiply, become established and spread unchecked.

Monitoring of neglected farms, including hobby farms should be proactive to reduce the risk of establishment and spread of new pests.

Report any farms that you suspect are neglected to your state department of agriculture and industry association to reduce risks of biosecurity threats spreading.

Record the results of monitoring activities

Surveillance involves looking for pests and diseases, or plant health issues on your farm and recording their presence and population levels, or their absence.

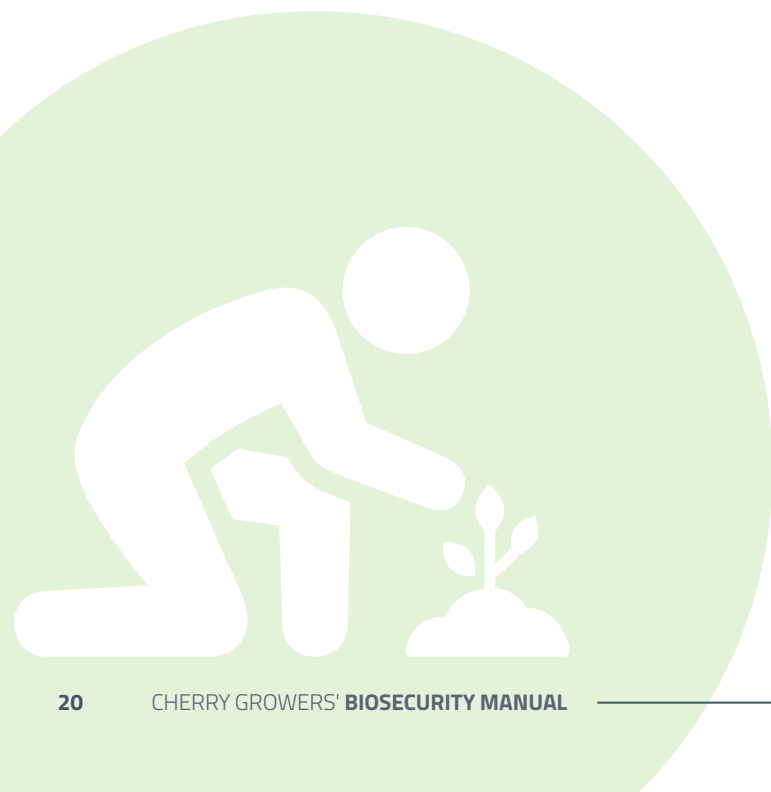
In addition to assisting with farm management, pest surveillance is important for maintaining the Australian cherry industry's pest free trading status.

A pest surveillance record sheet is provided in the back of the Cherry Export Manual and can be downloaded from cherrygrowers.org.au/biosecurity

Recording that a pest is absent is just as important as recording what you do see.

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881



The importance of pest surveillance

Orchard monitoring and surveillance involves looking for and recording the presence, absence and population levels of pests. Pest surveillance is necessary for the following reasons.

- **Market access:** Export destinations for cherries 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 shown to be absent or under appropriate management to minimise risks to the importing country.
- **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 diagnosing pests and diseases) help to achieve a 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 or 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.

Growers registered for export with Cherry Growers Australia can access a crop monitoring and surveillance app. Contact Cherry Growers Australia for more information.

Learn about exotic pests

While Australia has one of the strictest border control systems in the world, there is always the chance that an exotic pest will make it into the country. The number of passenger arrivals and imported goods continues to increase so a serious exotic pest of the cherry industry might only be a day's flight away.

There is also a constant risk of pests and diseases moving by natural pathways from Papua New Guinea and the Torres Strait south onto mainland Australia, for example fruit flies.

A new pest on your farm might also be new to the region or even the country.

To increase the chances of early detection, become familiar with the established and exotic pests that pose the greatest risk to the Australian cherry industry.

Display shed posters where staff will see them and learn to recognise key pests or can refer to if they find something unusual.

At the back of this manual there is a series of fact sheets on exotic pests and diseases, showing what they look like or the symptoms that they cause.

Prompt reporting of anything unusual is vital. Only if new problems are found early can they be contained or eradicated.

Farmers, contractors and consultants have an important role to play in reporting suspicious pests immediately to minimise potential damage. All reports will be investigated and treated confidentially.

Growers are often the first to notice the presence of a new biosecurity problem, so it pays to be familiar with the worst exotic and regionalised weed, pest and disease threats.

Reporting pests

In addition to state general biosecurity obligations, cherry growers have a legal responsibility to report suspect pests because the cherry industry is a signatory to the Emergency Plant Pest Response Deed (see page 19).

If you find a pest that you think might be exotic, take the following precautions to contain it and protect other parts of your farm:

- Mark the site where you saw the pest.
- Do not touch, move, or transport affected plant material.
- Take a photo of the pest or disease symptoms. Pests that move too quickly to be photographed can be captured in a sealed container and frozen before being photographed.
- Restrict the movement of people, animals and equipment near the affected area while waiting for identification.
- Wash your hands, clothes and footwear that have been in contact with affected plant material or soil.
- Without delay, call the Exotic Plant Pest Hotline on 1800 084 881 to report it to your state department of agriculture.

Calls to the Hotline are forwarded to an experienced person in your state or territory government, who will ask some questions and arrange for an assessment of what you've found. If the Hotline in your state operates only during business hours, leave your full contact information and a brief description of the issue and your call will be followed up as soon as possible.

Incorrect handling could spread the pest further or make the samples unfit for diagnosis so always seek advice about collecting samples.

Agvet chemicals

Always use chemicals in accordance with the label. In addition to problems with safety, inappropriate or persistent use of chemicals can produce resistance in insects and weeds. This can cause more widespread and ongoing biosecurity problems.

Be sure to follow the instructions and observe withholding periods. Seek training in appropriate use of agricultural chemicals (e.g. AusChem or ChemCert™ training).

Keep a record of chemical treatments in a spray diary, specifying application rates and weather conditions.

Fences and property cleanliness

Secure boundary fences make it easier to control the movement of people, vehicles and equipment onto and around your property, minimising the risk of diseases, pests and weeds from entering and becoming established.

Fencing can also limit access by wild or feral animals that can carry pests, diseases and weeds. For example, feral pigs can pick up cherry pests and diseases as well as weed seeds while foraging elsewhere and carry them onto your property in the soil and mud attached to their skin.

Make sure that dropped fruit and waste from packing sheds is dealt with responsibly. Plant waste management options include a waste pit away from production areas, composting, using waste for power generation, burning or deep burial.

Rubbish dumps can attract pests or wild animals that carry diseases onto your property, so remove or contain anything that is likely to act as an attractant.

Case study – bacterial canker (*Pseudomonas syringae* pv. *morsprunorum*)

Bacterial canker is an established pest caused by *Pseudomonas syringae* pv. *morsprunorum*, a bacterial disease that affects sweet cherry, sour cherry, plum and Japanese plum. Cankers on branches and trunks are often identified by the gum which oozes out of the plant (known as gum exudate).

How does it spread?

Like all variants of *Pseudomonas syringae*, *Pseudomonas syringae* pv. *morsprunorum* is present in infected plant material and is therefore usually introduced into new regions via nursery material. The pathogen can be dispersed as droplets in the air and can be carried between trees and adjacent orchards in wind-driven rain.

Pseudomonas syringae pv. *morsprunorum* can infect wounds on plants and can also be transmitted via pruning implements.

Movement of bacterial canker associated with propagation material in the nursery trade is considered the primary means for its long-distance dispersal, but it is also capable of surviving in plant material such as leaf litter and twigs for up to 45 days after they fall from the plant.

As it does not form spores, *Pseudomonas syringae* pv. *morsprunorum* does not persist well in the environment without a plant host: nor does it become air-borne without help from wind or rain splash.

Pollinating insects such as bees have been shown to carry viable bacterial canker, however, their role in the transmission of the disease is unclear. Based on preliminary studies, a stand-down period of more than nine days before moving bee hives has been recommended.



Image courtesy of Alan L. Jones, plantwise.org/KnowledgeBank/DatasheetImages.aspx?dsID=44978

Gum exudation and upward extension of a canker on sweet cherry caused by *Pseudomonas syringae* pv. *morsprunorum*.

Life cycle

Bacterial canker survives on the surface of trees, in wood and buds. As such, infection can occur any time there is a wound, but activity is greatest as temperatures cool in autumn. Risk of infection is high during leaf fall (and associated formation of scars) and pruning. Exuded gum is also a source of infection.

Monitoring, control and management

The most effective mechanism for limiting the spread of bacterial canker is to clean pruning equipment well before and after use, and regularly during pruning activities. Page 15 outlines some of the recommended practices and procedures for cleaning vehicles and equipment on farm. These techniques can be employed to decrease the risk of the spread of bacterial canker.

It is critical to maintain regular monitoring for bacterial canker so that any infested tissue can be removed during dormancy to decrease the risk of the disease spreading during the growing season.

Protective chemical options are available for early in the growing season and post-harvest. Speak to your agronomist or consultant to find one that might be right for you and always apply according to instructions on the label.

There are exotic cankers which are not yet present in Australia. If you find a canker which causes more damage than normal or does not respond to the usual management strategies including chemical control, you should call the Exotic Plant Pest Hotline on 1800 084 881.

Farm outputs

Responsibility for biosecurity does not end when a crop leaves your property. The measures in place on your farm support biosecurity in your region.

Maintain good farm hygiene

Maintaining good hygiene practices can help to minimise the spread of pests around your farm.

Disposing of dropped fruit or waste from packing sheds carefully, especially where there is a suspected or known incidence of insect infestation or disease infection, can limit the spread on the farm.

Composting of healthy waste can serve as a useful nutrient source but composting of diseased waste is not recommended.

In addition to cleaning machinery before it is used on your property, it is also important to clean machinery before it leaves your property to avoid inadvertently moving pests and weeds off your property.

Vehicles that transport cherries may move from farm-to-farm posing a significant biosecurity risk that should be managed appropriately through the use of wash down and designated pick-up facilities.

Don't let trucks that travel from farm-to-farm into your production areas. Collect produce from the field in harvest bins or trailers and take it to a shed for transport off farm.

Ensure that trucks come onto the property via a single road and take produce from a loading dock or shed.

Post-harvest risks

There is a risk of spreading weeds, pests and diseases after harvest. Make sure that harvesters moved between blocks and farms are cleaned and disinfected.

Crates used to store cherries both in the field and off farm, pose a significant risk and it is essential that they are free of plant material and disinfected between crops.

Also make sure that trucks carrying cherries to another property for packing are cleaned.

Biosecurity doesn't only apply in the field. Some post-harvest diseases can be spread by air movement in packing sheds. An assessment of the risks is therefore recommended for the whole production chain.

Other post-harvest and farm output considerations

When aggregation of produce from multiple farms takes place in a packing shed to meet consignment quantities, special care should be taken to manage waste to avoid introducing a new pest to your farm.

Take care when transporting undersized cherries and other waste. Diseases could be spread to crops on nearby properties since some diseases are spread by spores that can be blown off a passing truck.

It is recommended that waste cherries are properly disposed of as they can attract and harbour pests and diseases.

The suite of Australian cherry biosecurity publications

There are three main publications that have been developed by Cherry Growers Australia (or by other organisations in partnership with Cherry Growers Australia) which relate to biosecurity in some way. Each of these publications has a different purpose.

Cherry Export Manual

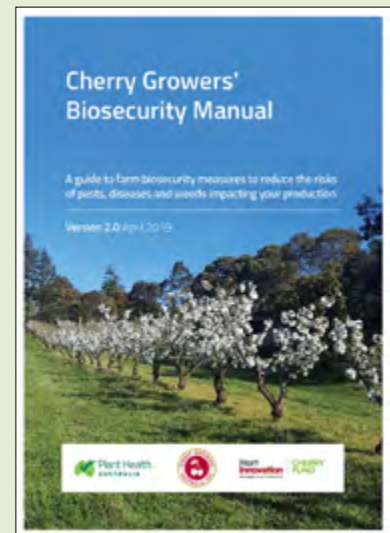
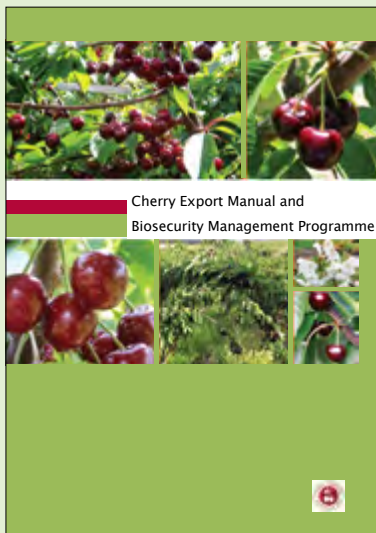
The Cherry Export Manual provides export guidelines for all cherry growing regions in Australia. It draws together information on crop monitoring and packing to address export market requirements to over 26 countries and provides a nationally consistent framework for the cherry industry. The development of this document was funded by the Hort Innovation project CY16004.

Australian Cherry Industry Biosecurity Management Programme

The cherry industry's Biosecurity Management Programme (BMP) has been instrumental in creating an industry culture to ensure Australian cherries are free from pests and diseases of quarantine concern. Nationally, the cherry industry's BMP aligns with biosecurity regulation and values of the Australian Government, state agencies and Plant Health Australia. The development of this document was funded by the Hort Innovation project CY16004.

Cherry Growers' Biosecurity Manual

The Cherry Growers' Biosecurity Manual (this publication) is provided to all Australian cherry growers registered with Cherry Growers Australia. The purpose of this manual is to provide growers with practical advice on how to manage biosecurity risks on farm. This manual has been developed as part of the Hort Innovation funded project CY16010 Review of the National Biosecurity Plan for the Cherry Industry and Development of a Biosecurity Manual for Cherry Producers. This manual is one of the action items resulting from the Biosecurity Plan for the Cherry Industry, the development of which included the review of 107 exotic invertebrate pests and 70 exotic plant pathogens (that cause diseases) and nematodes from which nine High Priority Pests (listed on pages 40-48) were derived. The three sections in this manual – information about on-farm biosecurity, a self-assessment check list and identification of exotic pests – together help cherry growers minimise risks to their farms.



Feral animals and weeds

Feral animals pose a risk to your property through direct impact on production but can also carry diseases, pests and weed seeds onto and around your property.

Vermin such as rats can damage crops, spread animal diseases and contaminate water sources. Weeds too, are a significant problem as alternate hosts for pests and diseases.

In addition to their direct effects, feral animals and weeds can spread and harbour plant pests and diseases, providing additional reasons to manage them.

Wild and feral animal access

Flying foxes, wallabies, hares, some birds and other feral and wild animals, such as deer, pose a threat to cherry production because they can passively carry disease causing organisms in dirt or mud on their bodies when they move around a property or onto other properties.

Fencing or overhead cover that prevents animal access will provide some protection. It is therefore important to check and mend broken boundary fences and orchard exclusion netting.

Develop and implement an integrated wild and feral animal control program. For best results, work with neighbours and other growers in your local area to implement a coordinated approach to feral animal control.

Ensure farm buildings are in good repair and remove any sources of feed for animals.

Volunteer plants and weeds

Weeds, volunteer *Prunus* species or other crop plants that have escaped from production areas can create a 'green bridge' that can harbour pests or diseases between seasons. Pests then have the potential to infect the early stages of growth of the next crop.

Where necessary, control volunteers and weeds within the orchard and externally, such as along roadways and boundary fence lines.

Establish a weed management plan for your property, including plans to eradicate, contain or manage current weeds on your property, and to prevent the introduction of new ones.

You are likely to need a combination of practices to manage existing weeds, including herbicides and cultural practices like farm hygiene.

Property and land damage

Fires, floods and storms can provide an opportunity for pests and weeds to become established, and for feral animals to enter.

Make regular inspections of your property for the presence of diseases, pests, weeds and feral animals.

Pay particular attention to areas that have been recently excavated such as new roads or dams and anywhere that has been damaged in storms or flooding. Keep an eye out for new weeds in the areas where flood waters may have run across your land from neighbouring properties and treat them before they flower and produce seeds.





Train, plan and record

Make sure that biosecurity procedures and threats are included in staff training and that biosecurity is part of farm planning activities. Record keeping is also an important part of managing your business, providing the ability to trace where planting material and other inputs came from and where produce goes.

Train staff

Since many people are not aware of how easily diseases, pests and weeds can spread, anyone coming onto your property, particularly into your production areas, needs to be informed.

It's important that everyone who comes onto the property, including staff, friends, family and contractors, is aware of the risks, and know about your procedures.

Inform staff of the biosecurity standards they need to adhere to and provide formal training or instruction if required. Staff can help monitor crops and keep an eye open for any problems, but education is important in preparing them to do this well.

Make sure employees and family members keep a lookout for unusual pests. In particular, make sure that they can recognise established and key exotic pests and that they know how to report them.

This is especially important for people working on grading lines. Any cherry damaged by an unfamiliar pest or disease and not suitable for sale should be brought to the attention of a supervisor and, if necessary, be referred for outside advice.

If the damage is suspected to be the result of an exotic pest, the Exotic Plant Pest Hotline should be called on 1800 084 881.

Posters in sheds featuring established and exotic pests can build awareness and serve as a reminder.

If you build your farm biosecurity measures around daily, monthly or yearly farm routines, then it should become a habit which is easily maintained.



Image courtesy of Charlotte Brunt

Ensure that everyone who comes onto your property is aware of the risks and know about your procedures.



Make a biosecurity plan for your property

An on-farm biosecurity plan will help you prioritise the implementation of biosecurity practices relevant to your property.

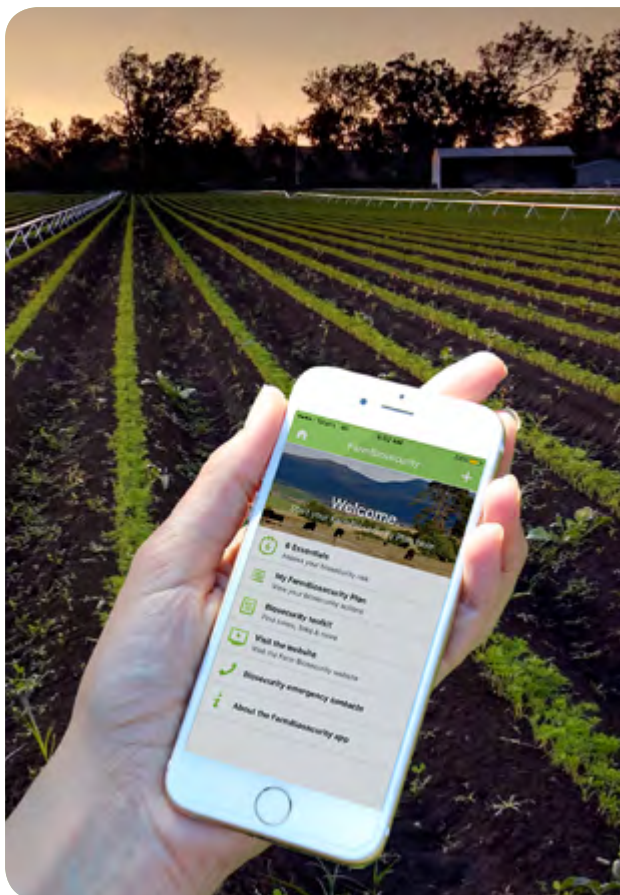
Use the checklist on pages 31–37 to identify gaps in your biosecurity preparedness.

Alternatively, use the free FarmBiosecurity app to create your own tailor-made plan. It is based on the six biosecurity essentials used in this manual.

Making a biosecurity plan using the FarmBiosecurity app is easy. Simply select the actions that apply to you from the suggestions, or type in your own actions. Your selections become a to-do list that you can share with others. You can attach photos as reminders or to let others know what needs to be done.

If you have multiple properties or sites, that's not a problem. You can add as many as you like.

The FarmBiosecurity app is available for free from the App Store or Google Play.



Keep records

It is good practice to maintain records as a matter of course. This includes a visitor register to trace people movements.

In the event of a new pest entry that prompts an emergency response, valuable time can be lost trying to determine how far the disease or pest may have spread. Sound record keeping can speed up this process and prevent further spread.

Templates can be downloaded and printed from farmbiosecurity.com.au/profiler

It is important to keep records of the sources of all inputs. In addition to fertiliser and budwood, record the movements of contractor machinery as well as where products and other material are sent to.

Additionally, if you have problems with a batch of fertiliser you will be able to use the records to demonstrate the effects on your property to the supplier.



You should be able to 'track back' and 'trace forward' if there is a disease, pest or weed entry on your property.

Biosecurity checklist

The following checklist can be used to identify the strengths and weaknesses of your farm biosecurity activities.



The checklist provides options to assess your business against different levels of biosecurity practices, from baseline activities to above industry standard.

This system of levels allows you to incrementally improve your biosecurity preparedness over time as necessary, practical and affordable.

Self-assessment will allow you to quickly establish where current practices are working well, help you to prioritise areas for improvement and plan to implement your on-farm biosecurity activities.

It should be revisited and updated as part of your annual farm planning activities to ensure that your day-to-day farm activities reflect the highest practical level of biosecurity preparedness.

Completion of this checklist is not compulsory and, except where stated, is not a legal requirement.

You could include the checklist as part of your quality assurance reporting to demonstrate your compliance with good farm management principles.

Levels of biosecurity practice

In collaboration with Cherry Growers Australia, four levels of biosecurity practice have been developed:

L1. Baseline – minimal biosecurity practices are used, and improvements should be made to minimise risks.

L2. Industry standard – biosecurity practices that reduce the risk of introducing new pests and diseases to a property are in use, however improvements could be made.

L3. Above industry standard – high level biosecurity practices are consistently applied to minimise the risk of introducing new pests onto or spreading pests within a property.

LR. Legal requirement – in some cases there are legal requirements which must be met before best practice management is considered. Any legal requirements must be met.

Copies of this checklist and other record templates can be downloaded from farmbiosecurity.com.au/profiler

People, vehicles and equipment		Yes	No	N/A	Action
Biosecurity awareness					
L1	Biosecurity signs at entry and control points. Pests threat posters are displayed in lunch room, packing shed or other work areas				
L2	In addition to L1, farm biosecurity information sheet is signed by all people accessing production areas				
L3	In addition to L2, training of all permanent and casual staff is undertaken and visitors are managed i.e. supervised access to the property				
LR	N/A				
Biosecurity zones					
L1	Discrete blocks or orchards identified on farm map (as required in export guidelines). Three zones applied to property (access, separation and production)				
L2	Movement plan developed and restrictions on movement from high risk areas of the property (or between linked properties) maintained				
L3	In addition to L2, clean down of equipment between blocks (as appropriate) undertaken based on a risk assessment				
LR	N/A				
Biosecurity signs					
L1	Biosecurity signs at gates				
L2	In addition to L1, signs are placed at checkpoints on farm (e.g. between biosecurity zones)				
L3	In addition to L2, signs in other languages (e.g. Vietnamese, Khmer) to cater for regular non-English speaking visitors				
LR	N/A				
People access					
L1	Single point of entry, biosecurity signs at entry and requirement to report to office or house on arrival				
L2	In addition to L1, visitors recorded				
L3	In addition to L2, visitor register includes recent (the previous 48 hours to one week) visits to other farms or cherry growing areas. Specific questions asked of people recently returned from overseas				
LR	N/A				

Vehicle access and cleaning			
L1	Designated parking area provided for staff and visitors		
L2	In addition to L1, vehicles accessing production areas, washed and disinfected. Vehicle cleaning register kept		
L3	External equipment not brought onto farm		
LR	N/A		
Clothes and shoes			
L1	Clothes and shoes of people accessing production zones are checked and cleaned on arrival to the farm		
L2	In addition to L1, boot covers used in higher risk areas		
L3	Clothes and boots provided to visitors and employees for use on farm		
LR	N/A		
Equipment access (for example bins, contract sprayers, utility providers)			
L1	Incoming equipment visually inspected and entry to farm stopped if there are signs of soil or plant material		
L2	In addition to L1, dedicated wash down area on the farm and a suitable detergent and disinfectant used (ask your agricultural supplier for the best product for you)		
L3	External equipment not brought onto farm		
LR	N/A		
Pruning equipment			
L1	Root trimming secateurs, and budding and grafting knives are washed and generally clean		
L2	In addition to L1, root trimming secateurs, and budding and grafting knives are washed with a suitable product between rows		
L3	Root trimming secateurs, and budding and grafting knives are disinfected with a suitable product between trees.		
LR	N/A		
Weeding or spraying equipment			
L1	Spraying equipment is cleaned with high pressure water and visually checked before each use		
L2	Spraying equipment is cleaned with a suitable detergent or degreaser and treated with a suitable disinfectant between blocks		
L3	In addition to L2, records of movement and cleaning are kept		
LR	N/A		

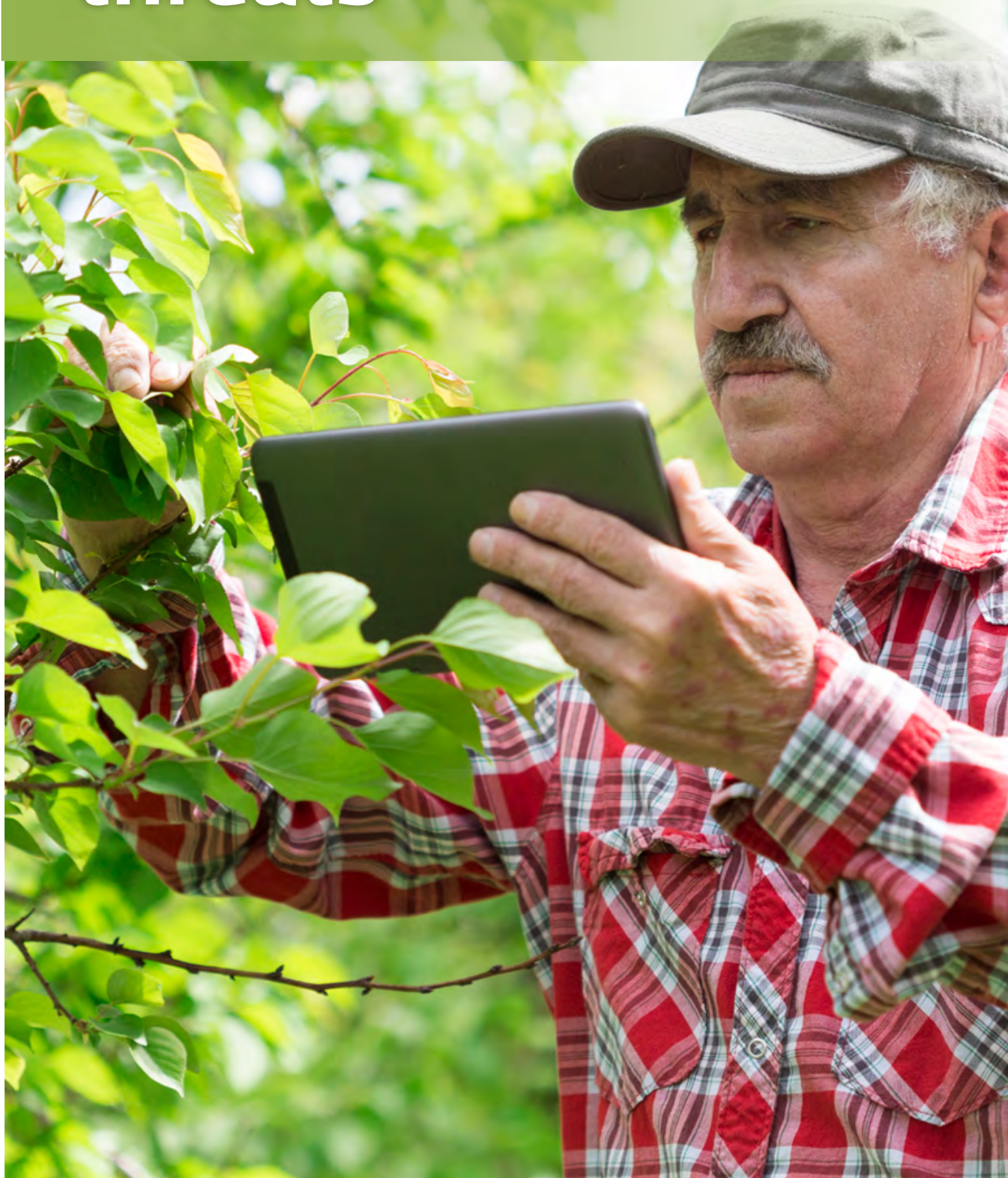
Farm inputs		Yes	No	N/A	Action
Propagation material					
L1	Planting and propagating material sourced from a reputable supplier (such as one with BioSecure HACCP accreditation), visually checked upon arrival and records kept about source of material and planting location on farm				
L2	In addition to L1, planting and propagating material treated with an appropriate fungicide and/or insecticide at time of planting				
L3	In addition to L2, material supplied by a certified producer of clean planting material with a defined and documented health status				
LR	N/A				
Organic fertilisers					
L1	Sourced from reputable provider				
L2	In addition to L1, visually inspected for contaminants				
L3	Sourced from a provider of certified fertiliser meeting AS4454 (2012)				
LR	N/A				
Water (dams, channels and ground water used for irrigation) and natural weather events					
L1	Water courses mapped and checked for weeds and feral plants which could harbour pests and diseases. Basic records of weather events made as a reference point for reporting when a new pest is found				
L2	In addition to L1, monitoring of orchards and water courses undertaken after major weather events				
L3	Structured surveillance undertaken around water courses or after significant weather events and records made of the details of the weather event such as wind direction, speed and anything different noticed in the days, weeks and months after the weather event				
LR	N/A				
Production practices					
Insect pest and disease identification and management					
L1	Orchard staff familiar with common established pests and how to report new pests. Regular crop surveillance (monitoring) undertaken and observations of pest presence and absence recorded in order to control pests at critical points or thresholds				
L2	In addition to L1, active management programs implemented on property boundaries for regionally established pests and diseases				
L3	In addition to L2, treatment activities recorded and orchard staff familiar with high priority exotic pests of cherries and absence of exotic pests recorded				
LR	Report anything unusual				

Effective use of chemicals				
L1	Chemicals applied according to the label			
L2	In addition to L1, awareness of resistance issues and alternative chemical treatment types rotated accordingly (see Cherry Growers Australia website for more information)			
L3	In addition to L2, resistance management strategy in place for herbicides, insecticides and fungicides. Records kept of pest populations before and after treatment			
LR	Chemicals applied according to state or territory legalisation			
Abandoned farms				
L1	Awareness of pest risks in your area			
L2	Regular monitoring of crops near your fence lines			
L3	Regional pest management strategies in place with monitoring and reporting to stop pests or disease build-up on abandoned farms			
LR	State biosecurity obligations to control endemic pests and report suspected exotic pests			
Feral animals and weeds				
Yes		Yes	No	N/A
Action				Action
Feral animal management				
L1	Consistent pest management activities conducted (e.g. baiting, trapping)			
L2	Risks for disease or insect pest by feral animals assessed			
L3	Regional pest management plan developed and implemented with neighbours or wider farming community			
LR	N/A			
Management of weeds and alternate hosts for pests				
L1	Monitoring of weeds which could act as alternate hosts for pests occurs throughout property and along property boundaries			
L2	In addition to L1, alternate pest host plants on the property and close to property boundaries are controlled and records kept			
L3	Regional approach to management of weeds and other plants that are alternate hosts for pests is undertaken			
LR	N/A			

Farm outputs		Yes	No	N/A	Action
Waste management					
L1	Mulch fallen fruit and prunings that have fallen in field				
L2	Healthy waste cherries and plant material (e.g. trimmings) are removed from the field to a designated on-farm disposal site for composting away from production areas and irrigation sources				
L3	All waste cherries and plant waste (trimmings) are removed from the field and destroyed by composting, burial or burning, or taken off-farm				
LR	N/A				
Harvest equipment management					
L1	Visual inspection of harvest equipment such as crates, trailers, tractors and cherry pickers before entry into each orchard (including own equipment)				
L2	In addition to L1, harvest equipment washed down with high pressure water before movement between blocks or orchards				
L3	Machinery washed between blocks with detergent followed by a suitable disinfectant. Blocks suspected of being infected with disease harvested last. Records kept of all cleaning and movement of equipment and machinery				
LR	N/A				
Packing shed management					
L1	Sorting or packing shed cleaned regularly				
L2	In addition to L1, fruit loaded and unloaded on paved or sealed area away from production zones				
L3	In addition to L2, packing shed cleaned regularly according to a schedule with records kept				
LR	N/A				
Management of packing shed waste					
L1	Waste from packing operations is fed to livestock or buried				
L2	In addition to L1, waste from packing other people's fruit buried in deep pits				
L3	Full destruction (for example burning) or deep burial and records kept on all waste removal associated with fruit (including that from other farms) and the treatments applied to that waste				
LR	N/A				

Train, plan and record		Yes	No	N/A	Action
Biosecurity planning					
L1	The Farm Biosecurity Action Planner or the FarmBiosecurity app is used as part of annual farm planning activities				
L2	In addition to L1, a farm zone map and biosecurity plan have been developed and are referred to when undertaking annual farm planning activities				
L3	A farm zone map has been developed. A biosecurity plan is developed in consultation with an agronomist or consultant as part of annual farm planning				
LR	N/A				
Staff training					
L1	Shed posters are displayed to draw staff attention to potential pest risks				
L2	Biosecurity training included as part of induction of all staff and family				
L3	External training is provided to staff on biosecurity management, including risk minimisation, exotic pest identification and reporting				
LR	N/A				
Record keeping					
L1	General records are kept about the timing of farm management activities including the arrival of new inputs, staff and equipment				
L2	Specific records of all movements on and off the property are kept. Records kept of pest presence				
L3	In addition to general farm management activities, records are made of surveillance activities, including pest absence				
LR	Spray records are maintained in line with state requirements for use of agricultural chemicals				

Pest and disease threats



Exotic pests

Cherry growers need to be familiar with the most serious exotic pests and diseases because there is always a chance that a disease could make its way past border controls into Australia.

The most serious exotic threats to the cherry industry – known as High Priority Pests – are described here.

Note that this list may change over time, as the High Priority Pest list is reviewed by a cherry industry biosecurity reference panel. For the most up to date information, visit the Cherry Growers Australia website cherrygrowers.org.au/biosecurity

Information on exotic pests of the cherry industry described here has come from a combination of:

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

Established pests

Established pests of biosecurity significance are pests that are contained within one or more regions, have market access implications and a significant impact on production, but can be kept off a property through on-farm biosecurity practices.

How pests are assessed

Each pest is assessed on the following criteria and given an overall risk rating. Pests rated a high risk are designated High Priority Pests, which have been agreed by the cherry industry and governments so that biosecurity efforts can be coordinated.

For High Priority Pests

Entry potential: There is a risk of introduction through a number of pathways including the legal importation of plant material, and via illegal pathways, contamination or natural means such as wind.

Spread: The pest could spread to most production areas largely unhindered, or it would be difficult to manage hitchhiking habits.

Establishment: The pest would be able to survive and establish in the environmental conditions that prevail in the majority of regions where the host is grown in Australia.

Economic impact: The pest would severely impact production, including host mortality or significant impacts on either crop quality or storage losses, or severe impacts on market access.

Note: Unless attributed otherwise all information is taken from Version 3 of the Biosecurity Plan for the Cherry Industry.

Spotted wing drosophila

Drosophila suzukii

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

Which crops does it affect?

Spotted wing drosophila (SWD) are an exotic fly pest that affect cherry crops. Other affected crops include apple, pear, plum, raspberry, blackberry, grape, strawberry, peach, nectarine, persimmon, blueberry and fig.

What does it look like?

- The eggs are oval and 0.4–0.6 mm long.
- Larvae are cream or white coloured and about 3 mm long.
- The pupae are reddish-brown, spindle-shaped and have two stalks with small finger-like projections. The pupae are 3.5 mm long and 1.2 mm wide.
- Adults are 2–3 mm long with red eyes, a pale brown or yellowish-brown thorax and black stripes on the abdomen. The antennae are short and stubby.
- Males have a small dark spot on the front edge of the forewing (females do not).

Which part of the plant will be damaged?

Fruit.

What should I look for?

- Infested fruit show small scars and indented soft spots on the surface, which is left by the females piercing the fruit to lay their eggs (known as ovipositing).
- Larval feeding results in the fruit collapsing around the feeding site due to SWD feeding on the pulp inside fruit and berries causing a depression or visible blemish on the fruit.
- Detection of SWD, as with a number of other insect pests that attack fruit, often occurs following detection of fruit rot caused by secondary infection by fungi and bacteria.

How does it spread?

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



Adult male flies (left) show distinct spots on the ends of their wings, which give the species their name. Adult females (right) do not have the spots present on their wings.

Photos courtesy of John Davis



Spotted wing drosophila pupae on damaged fruit surface.

Martin Hauser, California Department of Food and Agriculture

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881

Oriental fruit fly

Bactrocera dorsalis

Which crops does it affect?

The Oriental fruit fly has over 300 hosts including sweet cherry, sour cherry, Surinam cherry (*Eugenia uniflora*), Spanish cherry (*Mimusops elengi*), Jamaica cherry (*Muntingia calabura*). Other hosts of the fly include apple, pear, plum, peach, mango, banana, cashew, capsicum, citrus, pawpaw, cucumber, giant pumpkin, passionfruit, coffee, avocado, Japanese apricot, melon, Japanese plum, European pear, oriental pear and aubergine.

What does it look like?

- The eggs of *Bactrocera dorsalis* are very small (0.8 mm long and 0.2 mm wide) and will not normally be seen with the naked eye.
- The third-instar of *B. dorsalis* larvae are 7.5-10.0 mm long and 1.5-2.0 mm wide
- Puparium are white to yellow-brown, and approximately 60-80% the length of the larva.
- Adults have a clear wing membrane, except for a narrow costal band (band on outer edge of wing), which is colourless.
- The scutum (back surface of fly behind head and between the wings) is generally black with a yellow scutellum (the triangle on the bottom edge of the scutum).
- The colour of scutum varies in *B. dorsalis* from generally black, with an extensive lanceolate red-brown pattern, to almost entirely red-brown. Populations from the Indian subcontinent and Africa have extensive pale markings whereas specimens from Asia east of Myanmar mostly have dark scutum.

For help on identifying fruit flies, go to fruitflyidentification.org.au

Which part of the plant will be damaged?

Fruit.

What should I look for?

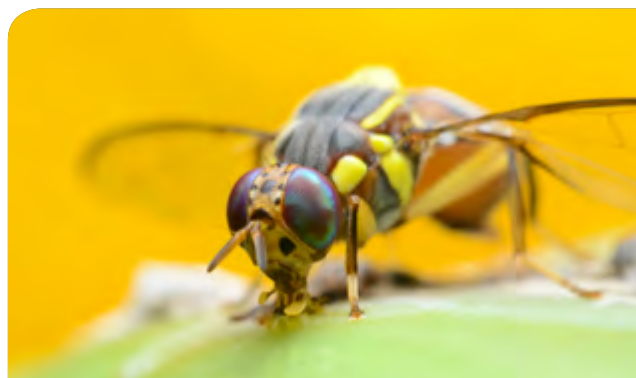
When adult females lay their eggs, they pierce the skin of the fruit; this is known as oviposition. Following oviposition there may be some tissue death around the puncture mark. This is followed by decomposition of the fruit. Symptoms therefore include fruit collapse, black or brown lesions on the fruit and premature fruit drop. Suspect fruit should be cut open and checked for larvae.

Larval identification is difficult, so if time allows, mature larvae should be transferred to saw dust (or similar dry medium) to allow for the formation of puparium. Upon emergence, adult flies must be fed with sugar and water for several days to allow hardening and full colour to develop, before they can be identified.

How does it spread?

Oriental fruit fly spreads via flying, hitchhiking, infested fruit and growing media.

Be aware that there are established and endemic fruit flies in Australia. If you find a fruit fly which causes more damage than normal or does not respond to the usual management strategies including chemical controls or use of beneficial insects you should call the Exotic Plant Pest Hotline on 1800 084 881.



Adult Oriental fruit fly.

Brown marmorated stink bug

Halyomorpha halys

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

What crops does it affect?

Brown marmorated stink bug (BMSB) has approximately 100 reported hosts including sweet cherry, persimmon, soybean, Siberian crab apple, apple, pear, pea, Japanese apricot tree, peach, raspberry, blackberry, grapevine, hazelnut, pecan, walnut, sweetcorn, tomato and citrus.

What does it look like?

- Eggs are smooth and pale in colour, approximately 1.3 mm in diameter by 1.6 mm in length and are laid in clusters of 20-30.
- When they hatch, BMSBs are brightly coloured, black and reddish-orange and remain clustered about the egg mass. They move away after moulting to the next stage of development.
- They are variable in size and colour: adults range from 12-17 mm in length, and 7-10 mm in width.
- The backs of adults are brownish in colour with a marbled or mottled pattern.

Which part of the plant will be damaged?

Flowers, fruit and leaves.

What should I look for?

- Adults and nymphs cause feeding damage.
- On tree fruits, feeding injury causes depressed or sunken areas.
- Late season injury causes corky spots on the fruit. Feeding may also cause fruiting structures to abort prematurely.
- Necrotic areas may form on leaves and feeding damage may ultimately be seen on the whole tree.
- There is frequently a distinct edge effect in crop plots as BMSB moves between orchards or crops on mass.

How does it spread?

BMSB spreads by flying, natural movement and hitchhiking.



Adult brown marmorated stink bug.

David R. Lance, USDA APHIS PPQ, Bugwood.org



Late instar, showing characteristic white bands on legs, antenna and along edge of body.

Gary Bernon, USDA APHIS, Bugwood.org



Newly hatched egg mass.

Gary Bernon, USDA APHIS, Bugwood.org

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881

Glassy winged sharpshooter

Homalodisca vitripennis (high priority exotic pest when carrying *Xylella fastidiosa*)

Which crops does it affect?

The glassy winged sharp shooter has a broad host range (over 300 species) including sweet cherry. Other hosts include citrus, plum, almond, peach, blackberry, grapevine, blueberry, bottlebrush, bougainvillea, camellia, acacia, chrysanthemum, macadamia and pistachio.

The glassy winged sharp shooter also carries and spreads the pathogen *Xylella fastidiosa* which impacts sweet and sour cherries (page 46).

What does it look like?

- *Homalodisca vitripennis* is a large insect (about 13 mm).
- It is generally brown to black, but the underside of the abdomen is whitish. The upper aspect of the head and thorax is brown or black with numerous ivory to yellowish spots.
- Sausage-shaped eggs are laid side-by-side in masses averaging 10-11 eggs. The egg masses appear as greenish elongated water blisters beneath the leaf.
- The nymphs are dark grey (first and second stage) to grey (third to fifth stage).
- The cast-off skin from the last moult of the nymphs often sticks to the stem or leaf surface.

Which part of the plant will be damaged?

Leaves, stems and the whole plant.

What should I look for?

- *H. vitripennis* is a stem feeder and leaves no visible symptoms of its feeding other than a white, powdery, dried excrement on plant surfaces.
- High densities of feeding sharpshooters excrete enough waste product to cause a 'rain', which falls from the trees.

How does it spread?

Glassy winged sharpshooters are spread by natural movement, infested plant material and assisted by humans.

- Nymphs are capable of short distance movement, while adults are strong flyers.
- Rapid and long-distance dispersal by egg masses occurs via nursery stock and human assisted movement of contaminated materials in vehicles.
- Plant trade can move fruit, leaves and stems infested with eggs, nymphs and adults long distances.



Adult glassy winged sharpshooter.

Johnny N. Dell, Bugwood.org



Glassy winged sharpshooter nymphs.

Kenneth Peek, Alameda County Department of Agriculture, USA

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881

Green headed leaf roller

Planotortrix octo

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

Which crops does it affect?

This moth affects stone fruit (including cherries), apple, wine grape, currants (black, red and white), gooseberry, kiwifruit, willow, alder, clover, poplar, flowering quince, hawthorn, quince, loquat, strawberry, boronia, choisya and citrus.

What does it look like?

- Young larvae have light green bodies and brown heads, however, later in their development their heads become greener.
- Green headed leaf roller 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. When at rest, the forewings overlap to form a bell-shaped outline.

Which part of the plant will be damaged?

Larvae damage the leaves, fruit and buds.

What should I look for?

- 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 pesticide treatments to control leaf rollers may also suggest the presence of exotic leaf rollers.

How does it spread?

The green headed leaf roller spreads via natural movement and the adults can fly.



Dorsal view of adult green headed leaf roller.

Pest and Diseases Image Library, Bugwood.org



Ventral view of adult green headed leaf roller.

Pest and Diseases Image Library, Bugwood.org

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

☎ 1800 084 881

Brown rot

Monilinia fructigena

Which crops does it affect?

Brown rot affects sweet cherry and sour cherry. It also affects apple, pear, quince, stone fruit, apricot, plum, almond, peach, nectarine, Japanese plum, grapevine, azalea, roses, tomato, hazelnut, capsicum, blackberry, raspberry, strawberry, blueberry and fig.

Which part of the plant will be damaged?

Fruit, flowers, leaves and stems.

What should I look for?

- Infection of fruit can take place at any time during fruit development, but the disease is only severe in ripe or ripening fruits.
- Brown rot on ripening or mature fruit typically develops as a rapidly spreading, firm, brown decay.
- The first symptoms on ripe fruits are small, superficial, circular brown spots that quickly begin rotting. Within days the fruit are completely rotten and almost the entire surface is covered with fungi.
- Eventually the whole fruit becomes discoloured and dried, making it look mummified.
- Mummified fruit hangs on branches of trees until Spring or falls to the ground where it remains throughout the Winter months and becomes partly or completely buried beneath the soil or leaf litter.
- An egg-shaped canker can form on small branches, and gum is found at the advancing margin.
- Usually cankers are restricted to twigs and are not found on the previous year's wood. Cankers do not continue to enlarge from one season to the next.
- When environmental conditions are suitable, active cankers produce fungal spores.

How does it spread?

Brown rot spreads via infected plant material, mechanical actions, airborne spores, pruning tools and/or insects.

Be aware that there are established brown rots in Australia. If you find a brown rot which causes more damage than normal or does not respond to the usual management strategies including chemical control you should call the Exotic Plant Pest Hotline on 1800 084 881.



Brown rot symptoms on sweet cherry.

Tom Creswell, Purdue University, Bugwood.org



Brown rot symptoms on cherry.

Mary Ann Hansen Virginia Polytechnic Institute and State University, Bugwood.org

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

Pierce's disease

Xylella fastidiosa (multiple subspecies, high priority pest when with vector)

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

Which crops does it affect?

Xylella fastidiosa has a broad host range including cherry, sour cherry, coffee, lucerne, raspberry, grapevine, pear, almond, peach, plum, elm, sycamore, mulberry, oak, periwinkle, red maple, citrus and blueberry.

Which part of the plant will be damaged?

Whole plant, leaves, stems, roots and fruit.

What should I look for?

- Young shoots are stunted and bear greener, denser foliage than healthy trees.
- Lateral branches grow horizontally or droop, so that the tree seems uniform, compact and rounded.
- Leaves and flowers appear early.
- Leaves remain on the tree longer than on healthy trees.
- Leaves abnormally formed with unusual patterns, necrotic areas, yellowing and leaf death.
- Affected trees yield increasingly fewer and smaller fruits. After 3-5 years, they become economically worthless.
- Abnormally shaped, sized and coloured fruit, with mummification sometimes occurring.
- Dieback of stems, discoloration of bark, stunting or resetting of stems.
- Dwarfing of the whole plant.
- Dieback leading to total plant death.

How does it spread?

Xylella fastidiosa is spread by infected plant material and insect vectors and cannot survive outside a plant or insect vector.



Symptoms on cherry leaves.

Donato Boscia, CNR - Institute for Sustainable Plant Protection, UOS, Bari (IT), gd.eppo.int/taxon/XYLEFA/photos



Symptoms on cherry leaves.

Donato Boscia, CNR - Institute for Sustainable Plant Protection, UOS, Bari (IT), gd.eppo.int/taxon/XYLEFA/photos

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

☎ 1800 084 881

European canker

Neonectria ditissima (synonym *Neonectria galligena*, *Nectria galligena*)

Which crops does it affect?

European canker affects more than 60 species including sweet cherry, apple, European pear, Asian pear, loquat, walnut, oak, maple, horse chestnut and alder.

Which part of the plant will be damaged?

Whole plant.

What should I look for?

- Black or brown lesions on fruit.
- Canker on woody stem with eventual dieback of stems.
- Dieback of whole plant leading to plant death.

How does it spread?

European canker spreads via infected plant material, rain splash and water.

Be aware that there are established/endemic cankers present in Australia. If you find a canker which causes more damage than normal or does not respond to the usual management strategies including chemical controls, you should call the Exotic Plant Pest Hotline on 1800 084 881



Canker on branch.

Andre Abrahami, Wiki commons



Canker development on branch.

H.J. Larsen, Bugwood.org



Reddish lesion development on seedling.

William M. Brown Jr, Bugwood.org

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

☎ 1800 084 881

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

Plum pox (sharka)

Plum pox virus (Potyvirus)

EXOTIC PEST – CALL THE EXOTIC PLANT PEST HOTLINE IF SUSPECTED

What crops does it affect?

Plum pox affects plants of the genus *Prunus*. Affected plants include sour cherry, sweet cherry, plum, apricot, almond, peach, bitter cherry tree, dwarf cherry, mahaleb cherry, bird cherry, Canada plumtree, pin cherry and Japanese plum.

Which part of the plant will be damaged?

Leaves, stems, fruit, seeds and trunks.

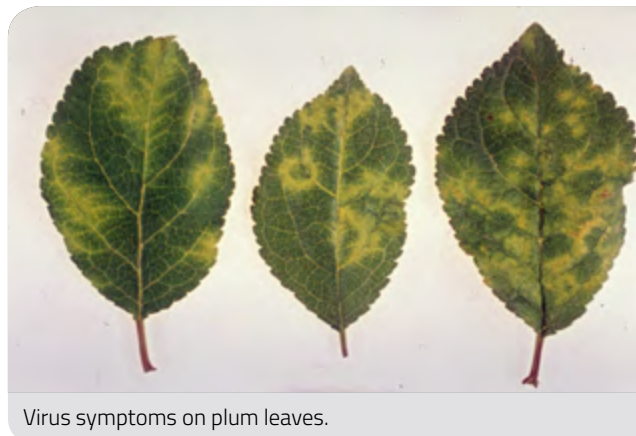
What should I look for?

- Symptoms may appear on leaves or fruits but depend on locality, season and cultivar. May also appear on trunks and stems.
- Symptoms are particularly clear on leaves in Spring as chlorotic spots, bands or rings and vein clearing or even leaf deformation.
- Fruit may drop off prematurely.
- Infected fruits may show chlorotic spots or rings.
- Diseased fruit is often deformed and shows internal browning of the flesh.
- Trunks can show splitting.
- Dieback of stems can occur.

How does it spread?

Plum pox is spread within orchards or to neighbouring orchards via aphid vectors, contamination of grafting tools and other mechanical actions.

Long distance dispersal of plum pox occurs through importation of propagation material (which may not show symptoms) that has been grafted with wood from infected *Prunus* trees. This is the most likely means of entry into Australia.



Virus symptoms on plum leaves.

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



Symptoms on plums.

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

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

☎ 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 19 for details).

Year/season: _____

Capital items			
Items installed on site (e.g. irrigation lines, harvest bins, protective covers, trellising, etc.)	Item details	Amount	Cost (depreciated)
Tree value			
Stocktake of existing trees	Variety	Tree age (and commercial life)	Number of trees
Cost of trees planted this season	Variety	Number	Cost
Crop value			
Area cropped	Total:		
	Variety	Location	Area cropped
Yield	Total:		
	Variety	Location	Area cropped
Market price (include evidence e.g. receipts)	Total:		
	Variety	Location	Area cropped

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)	

Additional copies of this summary can be downloaded from farmbiosecurity.com.au/profiler

A more detailed gross margin calculator can be obtained from cherrygrowers.org.au/biosecurity and an explanation of the cherry Owner Reimbursement Cost framework can be obtained from planthealthaustralia.com.au/orcs



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