

Orchard Biosecurity Manual

**for the apple and
pear industry**

**Reducing the risk of exotic pests entering
and becoming established in orchards**



Apple & Pear Australia Ltd.



Know-how for Horticulture™



Plant Health
AUSTRALIA

Plant Health Australia (PHA) is the peak body for plant biosecurity in Australia. We work in partnership with industry, governments, researchers and others to provide national coordination to improve biosecurity policy and practice across Australia's plant industries and build capacity to respond to plant pest emergencies.

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Overview

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Biosecurity is about the protection of livelihoods and lifestyles that could be harmed by pest and disease incursions. Biosecurity is a national priority and makes good business sense.

Orchard biosecurity refers to measures designed to **protect** your orchard from the entry and spread of harmful and unwanted pests and diseases. Biosecurity is the responsibility of you and every other person working on, or coming onto, your property.

Growers have a key role in protecting the Australian apple and pear industry from exotic pests and diseases. **Early detection and response** can reduce the impact on your orchard and on the whole industry and increase the likelihood of successful eradication if there is an incursion.

This manual has been designed to assist you to protect your apple and pear orchards and your industry from exotic pests and diseases using simple, yet effective **preventative strategies**. These are best practice techniques, and although they may involve increased labour and resources, employing these techniques in your day-to-day operations could **minimise costs** and **protect your orchard** and your livelihood for the long term.

The following 10 pests and diseases have been identified within the Apple and Pear Industry Biosecurity Plan, by a group of growers, researchers and field experts, as the priority exotic pests for apples and pears:

- Fire blight
- Black stem blight
- European canker
- Apple proliferation
- Oriental fruit fly
- Apple maggot
- Pear psylla
- Rosy apple aphid
- Pear fruit moth
- Asian gypsy moth

While the exotic pests and diseases listed in this manual are not the only ones that pose a threat to the apple and pear industry, they would have serious consequences if they were to become established. These pests and diseases do not usually enter an orchard by themselves. The most likely means of entry is by transportation onto a property on orchard machinery and equipment, people and their vehicles and planting and propagation material.

Once any new pest becomes established on a farm, it nearly always increases farm costs. This can be through the use of additional chemical controls, through maintenance or eradication costs, or through other management treatments. However, if new pests are **detected early enough** they can be eradicated or contained for just a fraction of the cost compared with the ongoing expense of management once pests become established.

While growers are actively involved in the day-to-day management of a range of pests already present on the farm, there is a need for everyone to be vigilant and adopt measures to prevent the introduction of new ones.

By using the simple and effective guidelines for orchard biosecurity included in this manual, you can help protect your orchards and your industry from exotic pests and diseases.



Biosecurity

The Importance of Biosecurity

Maintenance of our plant health status is vital for retaining existing trade opportunities and negotiating access to new overseas markets

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Australia's geographic isolation has meant that the region has been relatively free of many pests that have wrought havoc on plant industries overseas. **Freedom** from these exotic pests is vital to ensure the future **profitability** and **sustainability** of Australia's plant industries. In addition, Australia receives a real trade benefit in terms of securing **market access** domestically and internationally.

How Pests are Spread

Most pests are spread through the movement of people, animals, machinery, equipment, vehicles and planting material

While there is very little you can do to stop the spread of pests by birds, native animals, flying insects, wind and water, there is a range of biosecurity practices that can be adopted to limit the spread of pests hitching a ride on propagation material, people's clothes and shoes, and a range of transport modes such as vehicles, trucks, machinery and equipment. These measures are outlined in the following sections and represent **biosecurity best practice**.

Within this plan insects and snails, diseases and weeds are collectively referred to as pests.



Surveillance

Surveillance involves looking for, recording, and managing plant pests. Conducting regular surveillance gives you the best chance of identifying a new pest before it becomes established

Active surveillance is necessary because:

- Depending on the type of pest and the seasonal conditions, many plant pests can build up to high levels very quickly. For general management of established plant pests, regular inspections should be undertaken to determine the presence and level of plant pests. Integrated Pest Management should be a fundamental part of your orchard management practices.
- If fruit is to be exported, collection of 'evidence of absence' data for pests that are exotic to Australia and are of market access concern is now required. Information is required to prove that we have looked for a pest and that it hasn't been found.

- Surveillance at the orchard level may assist with completing the larger picture on knowledge of a particular pest presence within Australia.
- Early detection of exotic pests may improve the chance of eradication or containment within a region. If eradication or containment is not feasible, early detection in conjunction with contingency planning and preparedness (eg emergency chemical registrations, breeding and pre-emptive management) assists with a more rapid and effective response to the establishment of a pest.



Biosecurity

Reporting New Pests

If you find a new pest in your orchard, report it!

If you find a pest (including insects, snails, diseases, weeds and other organisms) that you haven't seen before, it could be new to your area, to the state, or to Australia.

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The earlier a new pest is identified, the better the chances of eradication or management. **Early detection** will also prevent long term damage to the individual grower and the apple and pear industry. A list of declared plant pests can be found for each State on its department of primary industries website.

Confidentiality is essential when reporting a new pest, particularly if the exotic pest has not been confirmed, as publicity can cause extreme stress for individuals and communities. In market-sensitive situations it could result in damage to the export market and unwarranted trade restrictions.

Familiarise yourself with the high priority pests for the apple and pear industry so that you are better able to identify any new pests to your orchard.

Also ensure that consultants working on your property are informed of their obligation to report anything unusual. It is critical that the detection of anything that is suspicious or that

they have not seen before is reported to the orchard manager or owner immediately.

If you find something unusual in your orchard call the Exotic Plant Pest Hotline on 1800 084 881.

This number will automatically direct your call to your local Department of Primary Industries or diagnostic laboratory. In all states, this number operates during business hours. Outside of business hours your details can be left on an answering service, so leave your name and number and a brief description of the issue to allow your call to be followed-up as soon as possible.

If you suspect you have found an exotic plant pest, the following general precautions should be taken:

- Do not allow movement of people and equipment near the affected plant material or area. Movement of people can spread pests very rapidly through regions and communities.
- Wash hands and clothes that have been in contact with the affected material.
- Do not send material until you have managed to contact your State Department of Primary Industries and confirmed the correct method for sending samples. Incorrect handling of samples could spread the pest further, or render the samples unfit for diagnosis. Departmental officers will assist with the correct protocols for sampling and identification of exotic pests.



Orchard Hygiene

10 People

People moving between orchards and regions can spread pests, especially on muddy boots and clothing worn at another orchard

While it is not practical to stop all people coming on to, or moving around the orchard, a number of measures can be used to reduce the spread of pests including:

- Ensure that all visitors' clothing, footwear and tools are free of soil or plant matter before entering and leaving the property. This is best achieved by ensuring that all visitors report to the house or office before they enter the orchard (see section on orchard signage).
- Provide boots or boot covers and overalls for visitors to the property.
- As an extra precaution provide scrubbing brushes and footbaths for people entering or leaving your property, or moving from contaminated to clean areas of the property. There are many disinfectants available. Consult with your local reseller to choose your best alternative.

Staff

Ensure that your staff are well informed of your biosecurity practices

Orchard biosecurity is everyone's responsibility. By providing adequate training for your staff you can ensure that your biosecurity practices are being upheld throughout your orchard. Devise a simple induction program based on the information contained in this manual to inform new and existing staff of the orchard biosecurity practices and protocols you employ on your property.





Overseas Visitors

Check that farm workers, family members and visitors recently returned from an overseas country have washed their clothes and cleaned their footwear

People returning from overseas after they have visited an orchard or market (especially where plant material was sold), can potentially spread pests if their clothing and footwear are not washed or cleaned before they wear them in your orchard.

With the speed and regularity with which we now travel internationally, some pests can be only 24 hours from our borders. Clothes, hair and even watchbands can carry fungal spores or bacteria, and weed seeds can easily lodge in clothes and pant cuffs. Great care should be taken not to inadvertently introduce overseas pests into Australia's apple and pear growing regions.



Vehicles, Machinery and Equipment

Vehicles and farm equipment can carry pests attached to soil and plant material

Motorcars, utes, trucks and farm equipment such as sprayers and tractors, can carry soil (especially in wet conditions) and plant debris containing unwanted pests. These could then be transported to other parts of the orchard, or to other properties. Preventing the spread of contaminated plant debris and soil by washing down machinery, or denying access of dirty machinery, could prevent pest introductions onto your property. Contractors can, and should, be requested to clean their equipment before entering any orchard.

Orchard Hygiene

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Measures to consider:

- Keep farm vehicles clean by clearing the vehicle floor of soil, grass and weed seeds and insects, especially after visiting other properties.
- Where possible, use your own vehicle to carry visitors around the property.
- In production areas of the property, keep vehicle movement to a minimum, especially when the soil is wet.
- Hose off machinery before moving between properties.
- Use high-pressure water or air to remove plant material and soil from larger equipment and machinery. Always ensure that borrowed equipment and machinery purchased at clearing sales is cleaned of all plant and soil before using them on your property.
- Regularly clean all tools and equipment, including secateurs, grafting knives, pallets and palecons, boxes, bags, trimmers, and any other equipment used on the farm, preferably with an antiseptic solution. If secateurs or grafting knives are used, dip them in methylated spirits when moving between trees.
- Provide a wash-down area at the property entrance and near the main buildings, with a sump that can trap pests and be inspected if necessary.

Designated Parking Areas

A well signed, designated parking area provides the visitor with clear directions of where to park

A parking area allows the orchard manager to contain possible entry of new pests to an area away from orchards and storage facilities and to inspect tyres, equipment, floor mats and boots for unwanted pests.

A sign, situated in the parking area, will remind visitors of the risk of spreading pests between properties and acts as a prompt for them to consider where they have just travelled from, and where they will be travelling to next.



Wash Down Facilities

A wash down facility allows visitors and contractors to clean their vehicle and equipment

Providing a high-pressure wash down facility and cleaning equipment will assist you and your visitors to clean down a suspect vehicle or piece of equipment. The area around the wash-down facility should be checked regularly for the presence of weeds or new pests. Any new introductions should be managed as soon as possible.

Wash down areas should:

- Be readily accessible and located between the driveway and farm roads
- Have access to power and water
- Have a sealed (concrete or bitumen) or packed gravel surface
- Not drain into a waterway or orchard

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

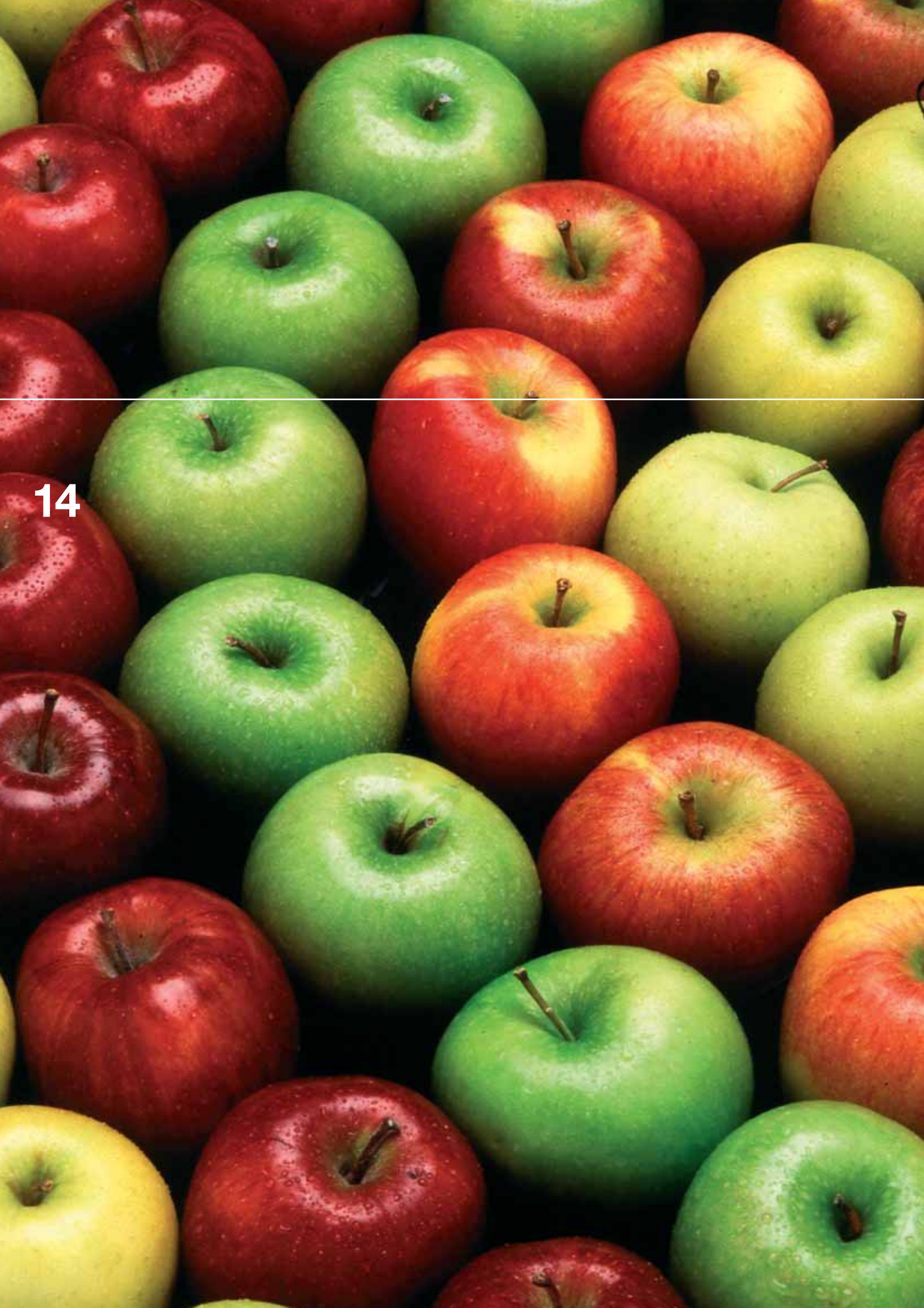
Another alternative to water is using high-pressure air to clean machinery and equipment. This technique however should only be used in a position well outside your production area.

Fruit and Fruit By-Products

Maintaining good hygiene when dealing with fruit and fruit by-products can minimise cross-contamination and breeding environments for pests

To ensure good hygiene:

- Maintain an effective monitoring/pest management program. A 'spray diary' record should accompany each consignment of fruit and fruit products.
- Collect and dispose of fallen fruit
- Fruit should be loaded onto trucks on a concrete or bitumen pad outside the production area
- Waste from fruit should be disposed of at least 100 metres from the nearest fruit trees
- Alternatively, waste can be hot-composted
- Ensure that no soil, leaf-material or insects are left adhering to, or are left in the container where fruit has been packed in the field



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Orchard Hygiene

Biosecurity and Quality Assurance

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If you are a member of a Quality Assurance Scheme you are already applying some techniques of orchard biosecurity best practice

If your orchard adheres to any of the Quality Assurance schemes, such as Freshcare or the Woolworths Quality Assurance Scheme, it is likely that you are also applying fundamental techniques of orchard biosecurity best practice, in particular relating to product identification traceability and recall, and Integrated Pest Management and surveillance.

Membership to these quality assurance schemes improves access to domestic and international markets and provides an assurance to customers that fresh produce is safe to eat and has been prepared to meet any customer specifications. It also provides the foundation for good orchard hygiene practices and conforming to Orchard Biosecurity best practice.

Propagation Materials

16 Planting and Propagation Material

Obtain clean planting and propagation material from reputable sources to reduce the risk of introducing new pests.

You cannot accurately assess plant and root stock quality just by looking at it. They may appear clean and healthy but could contain diseases.

Ask questions about where the plants or propagation material originally came from and always try to purchase certified or quality assured plants or root-stock from reputable suppliers.

Using clean or certified planting and propagation materials reduces the incidence of disease and provides a useful safeguard for growers. Infected planting material can be the main source of spread for diseases affecting apple and pears.

To minimise the risk:

- Use propagation stock that is free of pests and diseases and regularly check crops for signs of pests and diseases.
- Seek out certified pest free stock, this will help ensure that your planting material is free from pests.

While time and budgetary constraints may limit your capacity to do so, reject poor or diseased material where possible, as it has the potential to infect your entire orchard.



Orchard Signage

18 **Biosecurity signs inform visitors and personnel that orchard biosecurity is a priority**

Visitors to the farm may not be aware of your orchard biosecurity practices and well-designed biosecurity signs can ask visitors to respect your orchard biosecurity without making them feel unwelcome.

Signs will also clearly demonstrate your orchard's commitment to a clean and safe property and alert people of the need to consider the possible impacts their visit may have on your business.

One of the simplest steps in implementing biosecurity practices in the orchard begins at the house and sheds by installing an orchard biosecurity sign. The main aim is to have visitors contact the owner, orchard manager or staff before entering the orchard.

For additional orchard biosecurity protection, orchard entrances, packing shed and farm gate signage might also be considered, along with other biosecurity measures such as well-signed parking areas and wash down facilities.

To ensure the effectiveness of your signage, good fencing — to keep visitors from entering the orchard anywhere other than the entrance — is desirable.



Biosecurity signs should include the following simple messages:

- do not enter the property without prior approval
- keep to orchard roadways and laneways
- use wash down facilities for cleaning vehicles, machinery and equipment
- your contact details including house phone, mobile number and two-way channel so that visitors are able to contact the owner or orchard manager even when no one is home.

Below is an example of a typical farm biosecurity sign:



Remember, nothing will protect your orchards more than a **good hard look**. The more rapidly these pests are picked up in an orchard, the more successful the chance of eradication or control. If you spot anything unusual in your orchard call the Exotic Plant Pest Hotline on 1800 084 881. You can also get more detailed information on these pests in fact sheets from www.planthealthaustralia.com.au.



Useful Contacts

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Exotic Plant Pest Hotline

1800 084 881

Plant Health Australia Ltd

www.planthealthaustralia.com.au

Apple and Pear Australia Ltd

www.apal.org.au

Horticulture Australia Ltd

www.horticulture.com.au

Commonwealth Government

Australian Quarantine Inspection Service (AQIS)

www.daff.gov.au/aqis

State Governments

New South Wales – Department of Primary Industries

Telephone: +61 2 6391 3100
Facsimile: +61 2 6391 3336
Postal address: Locked Bag 21, Orange NSW 2800
Email: nsw.agriculture@dpi.nsw.gov.au
Website: www.dpi.nsw.gov.au

Queensland – Department of Primary Industries and Fisheries

Telephone: 13 25 23
+61 7 3404 6999
Facsimile: +61 7 3404 6900
Postal address: GPO Box 46, Brisbane, QLD 4001
Email: growhelp@dpi.qld.gov.au
Website: www.dpi.qld.gov.au

Northern Territory – Department of Primary Industry, Fisheries and Mines

Telephone: +61 8 8999 2007
Facsimile: +61 8 8999 2010
Postal address: GPO Box 3000, Darwin NT 0801
Email: info.DPIFM@nt.gov.au
Website: www.nt.gov.au/dpifm/Primary_Industry

Tasmania – Department of Primary Industries and Water

Telephone: 1300 368 550
+61 3 6233 8011
Facsimile: +61 3 6234 1335
Postal address: GPO Box 44, Hobart, TAS 7001
Email: BPI.Enquiries@dpiw.tas.gov.au
Website: www.dpiw.tas.gov.au

Victoria – Department of Primary Industries

Telephone: 136 186
+61 3 5332 5000
Facsimile: +61 3 9658 4760
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Website: www.dpi.vic.gov.au

South Australia – Department of Primary Industries and Resources SA

Telephone: +61 8 8226 0222
Facsimile: +61 8 8226 0476
Postal address: GPO Box 1671, Adelaide, SA 5001
Website: www.pir.sa.gov.au

Western Australia – Department of Agriculture and Food

Telephone: +61 8 9368 3333
Facsimile: +61 8 9474 2405
Postal address: Locked Bag 4, Bentley Delivery Centre
WA 6983
Email: enquiries@agric.wa.gov.au
Website: www.agric.wa.gov.au

**For further identification and images
of plant pests visit:**

PaDIL

www.padil.gov.au

Orchard Biosecurity Checklist

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The greatest risk to orchard biosecurity is the movement of people, machinery and plant materials between orchards and between regions. Orchard hygiene is of utmost importance in minimising the risk of spreading pests and diseases. This checklist provides best practice techniques to reduce the risk of introducing pests and diseases to your property.



Signage

- Have you put up signs at the main entrances to your property, providing detailing of biosecurity requirements and contact information?

People

- Do you have a farm visitor register?
- Do you ensure that all visitors' clothing, footwear and tools are free of loose soil or plant matter before entering and leaving your property?
- Have you provided a wash-down area, preferably concrete, at the property entrance and near the main buildings, with a sump that can be inspected if required?
- As an extra precaution, do you provide scrubbing brushes and footbaths for people entering or leaving your property, or moving from contaminated to clean areas of the property, especially if there is an identified threat of an incursion?

Training

Are staff aware of biosecurity protocols:

- how to keep vehicles and equipment clean
- how to identify pest symptoms
- aware of how to report pest symptoms
- how to manage waste plant material
- aware of reasons for, and importance of biosecurity in the orchard



Vehicles

- Do you keep farm vehicles clean by frequently clearing the vehicle floor of soil, grass and weed seeds and insects?
- Do you wash down vehicles entering the property and direct waste water into a sump?
- Do you, where possible, use your own vehicle to carry visitors around your property?

Machinery and Equipment

- In production areas of the property, do you keep vehicle movement to a minimum, especially when the soil is wet?
- Do you use high pressure water to remove plant material and soil from larger equipment and machinery?
- Do you regularly wash all tools and equipment, including secateurs, grafting knives, pallets and palecons, boxes, bags, sprayers, trimmers, tractors, trailers and any other equipment used on the orchard, preferably with an antiseptic solution?
- Do you ensure borrowed equipment and machinery purchased at clearing sales is free of plant and soil material before use?
- If secateurs or grafting knives are used, do you dip them in methylated spirits when moving between trees?

Planting and Propagation Material

- Do you use propagation stock that is free of pests, diseases and weeds and regularly check crops for signs of pests, diseases and weeds?

Fruit and Fruit By-Products

- Do you maintain an effective monitoring/ pest management program?
- Do you collect and dispose of fallen fruit promptly?
- Is fruit loaded onto trucks on a concrete or bitumen pad outside the production area?
- Is waste from fruit disposed of at least 100 metres from the nearest fruit trees?
- Alternatively, is waste hot-composted?
- Do you ensure that no soil, leaf-material or insects are left adhering to, or are left in the container where fruit has been packed in the field?

Awareness

- Have you familiarised yourself with the high priority pests for the apple and pear industry to assist you in the identification of any new pests to your area?
- Do you conduct active surveillance?
- Do you record surveillance activities even when no exotics are found?

Pest Record/Surveillance Data Sheet (Example)

Orchard Name: _____

GPS (optional): _____

Date	Name of inspector	Location description e.g.: row number, area of orchard	Pest/symptom being assessed	Symptom / injury levels Number or % per tree or high, medium or low rating	Weather and temperature conditions	Exotic pest identified (Yes/No)	Action taken e.g. spray, sample sent for diagnosis

Fact Sheets

Fact Sheet

Exotic threat: Fire blight

What is it?

Fire blight (*Erwinia amylovora*) is serious bacterial disease of apples and pears that affects all parts of the tree including blossoms, leaves, shoots, branches, fruits and roots. Any earlier damage to the tree will increase susceptibility, and death of the affected part of the tree is rapid. Young trees are especially susceptible to death, while mature trees will usually survive.

Heavy rainstorms, birds, insects or animals or an infected plant rubbing against its neighbour can all spread fire blight. The bacteria can also be spread on infected tools, equipment and clothing.

Outbreaks tend to be very erratic, causing severe losses in some orchards in some years and little or no significant damage in others. A serious epidemic of Fire blight is likely to decrease apple and pear production by up to 50%.



An apple shoot with fire blight, note “Shepherds crook”

Source: A.L. Jones

What do I look for?

Fire blight gets its name from the burnt appearance of affected plants. Symptoms of fire blight include water soaked then dark, sunken, dry twigs, dead branches that appear burned or a deep rust colour, branches bent in a “shepherds crook”; dead leaves and fruit that remain on the tree. Fruit may also ooze a translucent, amber coloured liquid, containing masses of bacteria.



Fire blight

Source: A.L. Jones



Bacterial ooze exuding from apple

Source: A. L. Jones

Where is it found?

The fire blight pathogen is present in most of Europe and parts of the Middle East and is widespread throughout the United States, Canada and New Zealand.

Reporting

The best way to prevent the devastating impact of this disease on the Australian apple and pear industry is to report any suspicious disease symptoms immediately. Early detection will improve the chances of eradication.

Growers may report suspected exotic pests to the Exotic Plant Pest Hotline (**1800 084 881**) or can directly contact their relevant state agriculture or primary industries department.

To minimise the risk of disease spread, samples should not be moved until they have been checked by an expert.

This fact sheet is part of the National Apple and Pear Industry Biosecurity Plan. For more information about the Biosecurity Plan, please contact Plant Health Australia.



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Fact Sheet

Exotic threat: Pear Fruit Moth

What is it?

The pear fruit moth affects pears only. Damaged fruit usually fails to develop properly, turns black and has a shrivelled appearance. Fruits remain on the tree even until the following year. During summer webbing caused by grubs appear on insect exit holes and masses of excreta on the exterior of the fruit causes quality to be downgraded .

In Russia the pear fruit moth is rated as the most serious pest of cultivated pears, damaging up to 90% of pear crops. It is also considered of economic importance in Japan.

What do I look for?

Adults moths are greyish with a violet tinge and a wingspan of 15-22 mm. During summer, the entry holes of the pest are characteristic as they are most often at the calyx end or side of the fruit, with the upper

side of the opening marked by an overlapping lip of accumulated excreta.

Fruits are normally stunted in growth and turn black with a shrivelled appearance, remaining on the tree until the following year.

Where is it found?

Pear fruit moth is native to the temperate zone of eastern Asia, where it is widely distributed. In Japan, it is distributed in all pear growing regions and it has limited distributions in Russia and China.

Reporting

Growers may report suspected exotic pests to the Exotic Plant Pest Hotline (**1800 084 881**) or can directly contact their relevant state agriculture or primary industries department.

To minimise the risk of disease spread, samples should not be moved until they have been checked by an expert.

This fact sheet is part of the National Apple and Pear Industry Biosecurity Plan. For more information about the Biosecurity Plan, please contact Plant Health Australia.

References

<http://www.cabicompendium.org/cpc/report.asp?CCODE=NUMOPI&criteria=T/SY2>



Adult Pear Fruit Moth

Source: A. Sasaki



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www.planthealthaustralia.com.au



Fact Sheet

Exotic Threat: Asian Gypsy Moth

What is it?

The Asian gypsy moth (*Lymantria dispar*) is one of the most destructive pests of forest, horticultural and urban trees in the northern hemisphere. If this exotic pest is introduced into Australia it could cause extensive environmental and economic damage to our native bush, forests, orchards and gardens. The larval (caterpillar) stage of this pest causes heavy defoliation of trees and shrubs, killing them or increasing their susceptibility to other insect pests or diseases. Once introduced into a new area, the risk of establishment of the Asian gypsy moth is extremely high because of its broad host range. The larvae feed on the foliage of more than 600 species of trees and other plants.



Asian gypsy moth (*Lymantria dispar*) egg mass on a shipping container.

Source: Manfred Mielke, USDA Forest Service, Bugwood.org
fred Mielke, USDA Forest Service, Bugwood.org www.forestryimages.org.

What do I look for?

The Asian gypsy moth has four life stages: egg, larva (caterpillar), pupae (cocoon), and moth. The most likely means of entry into Australia is from egg masses deposited on board cargo ships, containers or packing material. The egg masses are usually covered in yellow or light tan fuzz from the abdomen of the female moth and contain 100 – 1000 eggs. Egg masses are oval in shape and about 40 mm long and 20 mm wide.

The larval stage (caterpillar) is hairy and mature larvae range in size from 50 – 65 mm long. They may be a variety of colours along the back, including black, grey or yellow, but they typically have two rows of spots on their back; five pairs of blue spots followed by six pairs of red spots (see picture). The pupal stage is dark reddish-brown and held in place by strands of silk.

Adult male moths have greyish-brown wings and a wingspan of 30–40 mm, whereas the adult female moths are white with black markings and larger with a wingspan of around 40–70 mm (see picture).

If you see any of these life stages of the Asian gypsy moth, you should report them immediately to increase the chance of eradicating this pest before it can become established in Australia.



An Asian gypsy moth larva.

Source: John Ghent, USDA Forest Service, Bugwood.org.



The Asian gypsy moth adult male (bottom right) and female (left).

Source: PHIS PPQ Archive, USDA APHIS PPQ, Bugwood.org.

Where is it found?

The Asian gypsy moth originated in Asia, and is now found throughout eastern Russia, China, Korea and Japan. There have been several introductions of the pest into North America since the early 1990s which have been the subject of intensive control and eradication campaigns to prevent its establishment in the United States. The pest was also introduced into New Zealand in 2003 and subsequently eradicated.

Reporting

Growers may report suspected exotic pests to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their relevant state agriculture or primary industries department.

To minimise the risk of disease spread, samples should not be moved until they have been checked by an expert.

This fact sheet is part of the National Apple and Pear Industry Biosecurity Plan. For more information about the Biosecurity Plan, please contact Plant Health Australia.



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Fact Sheet

Exotic threat: Rosy apple aphid

What is it?

The rosy apple aphid (*Dysaphis plantaginea*) is a major pest of apple trees in North America, causing leaf, fruit and root damage. It is the most destructive of all the aphid species which attack apple, with severe outbreaks causing damage to up to 50% of fruit. When the aphid feeds on fruit clusters, it injects saliva which contains chemicals that alter plant growth, causing bunching, stunting and malformation of the fruit (see picture). The rosy apple aphid attacks all apple varieties.



The rosy apple aphid (*Dysaphis plantaginea*).

Source: Michigan State University, USA.

What do I look for?

The rosy apple aphid is a small, soft-bodied insect with piercing-sucking mouthparts and two cornicles or 'tailpipes' projecting from the back of the abdomen. The rosy apple aphid has three life stages: egg, nymph and adult. The eggs are an oval shape, about 0.5 mm in length and greenish-yellow in colour when first laid before they turn shiny black. The eggs are usually laid on twigs, bud axils, or in crevices in the bark.

The individuals which hatch from the eggs are all wingless. They range in length from 0.4 – 2.0 mm; as they grow, the aphids change in colour from dark green to rosy purple and some develop wings. Winged adults are 2.0–2.5 mm in length and are brownish-green and black in colour. Wingless adults are rosy brown or purple in colour and are covered in a greyish-white wax coating.

If you think you have seen the rosy apple aphid, you should report this immediately to maximise the chances of eradicating this pest before it can become established in Australia.



A rosy apple aphid colony.

Image Whitney Cranshaw, Colorado State University, www.insectimages.org



Fruit malformation (right) caused by the rosy apple aphid.

Image New York State IPM Program.

Where is it found?

The rosy apple aphid occurs throughout the apple growing areas of North America.

Reporting

Growers may report suspected exotic pests to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their relevant state agriculture or primary industries department.

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Fact Sheet

Exotic threat: Apple Maggot

What is it?

The apple maggot is one of the most serious fruit fly pests in North America.

What to look for

Adult flies are somewhat smaller than house flies and have clear wings with characteristic black bands, a pronounced white spot on its back, and a black abdomen with light-coloured crossbands. The female fly is about 5.8 mm long with a wing span of 12 mm. The male is smaller than the female. Female flies have four crossbands on the abdomen, and males have three.

The eggs are 0.90 mm long, oval, semi-opaque and creamy white. When full grown, larvae are 8 mm long and 2 mm wide and look like a fly maggot. They are usually cream-colored. The pupa is pale yellowish brown and oval shaped, and about 4.5 mm long and 2 mm wide.

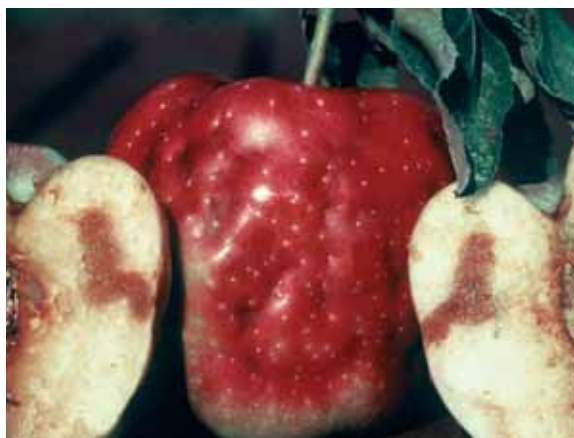


Adult apple maggot fly

Source: Agriculture & Agri-Food Canada

Damage

The flesh surrounding a puncture where eggs have been laid in immature fruit often fails to grow as the rest of the apple grows and becomes a sunken, dimple-like spot in the surface. When the larvae feed and move through the fruit, they leave a characteristic brown trail through the apple that can readily be seen when the fruit is cut open. When several maggots are in a fruit, the inside of the fruit may break down and depressions and discoloration may be visible from the outside. Similar damage can be caused by the Queensland fruit fly and Mediterranean fruit fly which are present in parts of Australia.



Larval tunnelling on apple.

Source: Whitney Cranshaw, Colorado State University, Bugwood.org

Where is it found?

Apple maggots are a major problem in the mid-western and eastern United States and eastern Canada. They are also found in California, Oregon and Washington.

Reporting

Growers can report suspect exotic pests or diseases to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their local department of agriculture or primary industries.

If suspect symptoms or pests are found, you should report this immediately. To minimise the risk of spread, samples should not be moved from your property.

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Fact Sheet

Exotic threat: Apple Proliferation

What is it?

Apple proliferation, also known as apple witches' broom, is caused by the *apple proliferation phytoplasma* and is a serious disease of apples. Cultivars vary in reaction but most, including seedlings, appear to be susceptible to some extent. The most sensitive cultivars include Belle de Boskoop, Gravenstein, Starking, Golden Delicious and Winter Banana. Roja de Benejama seems able to tolerate infection. The natural means of transmission are unknown, though leafhoppers have been reported as vectors. The disease can also be spread from tree to tree by grafting.



Example of "witches" broom

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

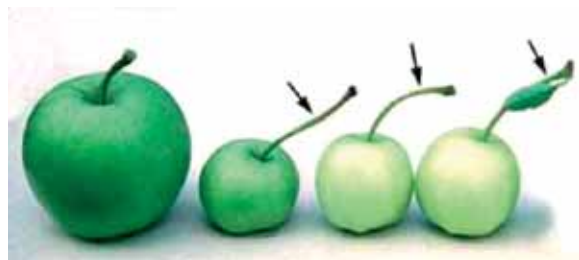
What to look for

Symptoms include the premature development of axillary buds to produce a proliferation of secondary shoots ('witches' brooms') near the top of the main shoot in summer and small fruit, and late growth of buds at the ends of the stems, in the autumn. Elongate stipules and leaf rosettes develop on the terminal parts of shoots. Root systems are compact and result in stunted growth of infected trees.

This disease may cause flowering to be delayed and flower parts to resemble leaves. Leaves emerge earlier and are yellow, irregularly serrated and small. Trees may exhibit early autumn colour (lilac or purplish red).

Fruits are few, small, incompletely coloured, and poorly flavoured.

Affected trees lack vigour, shoots are thin and the bark has a reddish-brown colour. Young trees are more severely affected than older trees. Leaves on infected trees are particularly susceptible to powdery mildew. With severe infections, trees may die.



Small fruits with elongated, narrow petioles (arrowed), along with a large healthy fruit.

Source: Loschi/DBADP, University of Udine, Italy



Chlorotic leaves with enlarged stipules (on cv. Golden Delicious)

Source: Loschi/DBADP, University of Udine, Italy

Where is it found?

Apple Proliferation is widespread in Europe. There are also unconfirmed reports from India and South Africa.

Reporting

Growers can report suspect exotic pests or diseases to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their local department of agriculture or primary industries.

If suspect symptoms are found, you should report this immediately. Samples should not be moved and water on the affected paddock should be isolated to minimise the risk that the disease might spread.

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Fact Sheet

Exotic threat: European Canker

What is it?

European canker (*Nectria galligena*) is an economically important fungal disease of apple and pear in many production areas throughout the world. It can kill young trees and branches of older trees. Losses of 10–60 per cent of the fruit crop caused by rot from European canker have been recorded.

The disease was present in orchards in Spreyton, Tasmania from about 1954 but was eradicated by 1991. Australia is currently free of the disease.



Nectria canker on main stem of young apple.

Source: T. Swinburne

What to look for

European canker affects mostly branches and trunks of trees. The first sign of the disease is reddish brown lesions which develop on small branches around a leaf scar, spur or pruning wound, usually in late spring or early summer. These elongate into cankers with ring-shaped cracks. The cankers may cause dieback of shoots and wilting or leaf drop in spring. Fruit harvested from trees infected with the fungus are likely to develop Nectria rot (see image). This rot rarely appears before harvest, generally developing in storage in all parts of the fruit. Skin over the rotted area becomes dark brown and as the flesh shrinks a depression may develop. Internally the flesh turns and a light brown and remains moist.



Apple fruit (cv. Bramley's Seedling) rotting by *N. galligena* after 3 months in CA store.

Source: T. Swinburne

How is it spread?

Spores from new cankers are spread primarily by rain or overhead irrigation. New infections are thought to occur mainly in the autumn through leaf scars, with symptoms appearing the following spring. Older cankers produce airborne spores that can set off new infections at large distances from the source. The airborne spores function mainly to initiate new infections, while the water-borne spores serve to intensify the disease in trees that are already infected.

Where is it found?

With the exception of Australia, European canker is present in all regions of commercial apple and pear production throughout the world.

Reporting

Growers can report suspect exotic pests or diseases to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their local department of agriculture or primary industries.

If suspect symptoms are found, you should report this immediately. Samples should not be moved and water on the affected paddock should be isolated to minimise the risk that the disease might spread.

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References

www.agf.gov.bc.ca/.../tfipm/images/european.jpg



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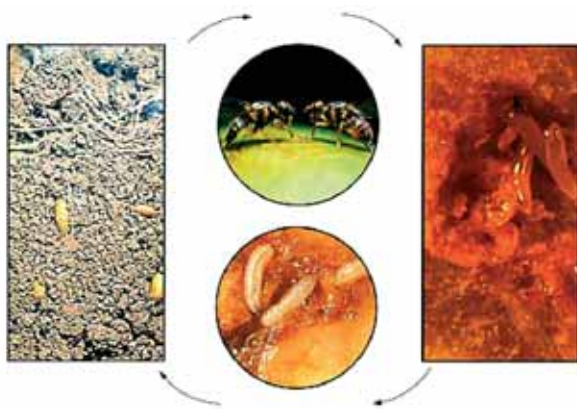
Fact Sheet

Exotic threat: Oriental Fruit Fly

What is it?

The oriental fruit fly, *Bactrocera dorsalis*, has been recorded on more than 150 kinds of fruit and vegetables, including citrus, mango, papaya, avocado, banana, tomato, apple, passionfruit, pineapple, peach, pear and apricot. Avocado, mango, and papaya are the most commonly attacked. The fly can damage up to 100% of unprotected fruit.

The larval tunnels created by the feeding larvae provide entry points for bacteria and fungi that cause the fruit to rot. When only a few larvae develop, damage causes reduced marketability due to the unsightly appearance of fruit caused by egg laying punctures or tissue break down due to decay.



Lifecycle of Oriental Fruit Fly

Source: www.agnet.org/images

What to look for

The adult oriental fruit fly is approximately 6 to 8 mm long, or slightly larger than the common housefly, with a narrow brown band along the edge of its wings.

The middle of the body is dark with two prominent, yellow stripes on top and yellow marks on each side. The abdomen is yellowish with a black T-shaped mark.

The female has a tube extending from the abdomen, which penetrates the host fruit or vegetable and deposits eggs inside.

Larval feeding in fruit causes breakdown of tissues and internal rotting. Infested young fruit becomes distorted, callused and usually drops and when fruit matures it develops a water soaked appearance.

Where is it found?

The oriental fruit fly is widespread throughout much of Asia and the Hawaiian Islands.

Reporting

Growers can report suspect exotic pests or diseases to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their local department of agriculture or primary industries.

If suspect symptoms or pests are found, you should report this immediately. To minimise the risk of spread, samples should not be moved from your property.

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Fact Sheet

Exotic threat: Pear Psylla

What is it?

Pear psylla, *Cacopsylla pyricola*, is the most important insect pest of pear, although it is usually more of a problem on European varieties than Asian varieties. Pear psylla also transmits the disease Pear decline (not present in Australia), which can cause death of the tree. The main source of economic injury is to the fruit.



Local lesions on leaves produced by psyllid feeding

Source: Whitney Cranshaw, Colorado State University, Bugwood.org

What to look for

The eggs are yellowish orange and very small (about 0.3 mm long). They are deposited in the creases of the bark, in old leaf scars and around buds. They are pear-shaped and have a smooth, shiny surface. Small, yellow, wingless nymphs (about 3 mm long) hatch from the eggs. They have red eyes and turn green, then brown as they mature. The nymphs feed and develop primarily on the newer, more tender, tree growth. The adults are dark reddish brown, have four wings and resemble a tiny cicada.

The pear psylla secretes large amounts of honeydew, which runs down over foliage and fruit and in which a sooty fungus grows. This causes the skin of the fruit to become blackened and scarred and the leaves to develop brown spots.



Larva covered with honeydew

Source: Whitney Cranshaw, Colorado State University, Bugwood.org

Excessive feeding and the injection of toxic saliva by large populations may cause partial to complete defoliation of trees, reducing vitality and preventing the formation of fruit buds. This type of injury is called “psylla shock”. Return bloom and fruit yield are often reduced the following season.

Where is it found?

Pear psylla is widespread throughout Europe and is present in all pear growing regions in the United States and Canada.

Reporting

Growers can report suspect exotic pests or diseases to the Exotic Plant Pest Hotline (**1800 084 881**) or contact their local department of agriculture or primary industries.

If suspect symptoms or pests are found, you should report this immediately. To minimise the risk that the pest might spread, samples should not be moved.

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Fact Sheet

Exotic threat: Black Stem Blight

What is it?

Black stem blight (also known as Asian pear blight) is a bacterial disease of Nashi pear (*Pyrus pyrifolia*) which is similar to fire blight. The disease was first identified in Nashi orchards in South Korea in 1995 and the pathogen *Erwinia pyrifoliae* was described as a new species in 1999. *E. pyrifoliae* is closely related to but distinct from *Erwinia amylovora*, the cause of fire blight of apple and pear. The extent and severity of black stem blight in Korean pear orchards is unknown, however severe losses in fruit production have been reported.

What do I look for?

The symptoms of black stem blight include black to brown stripes in the leaf midribs, dark brown leaf spot and necrotic petioles. Necrotic symptoms may occur on large parts of the trees and affect entire branches, blossoms and fruit.

E. pyrifoliae can only be differentiated from the closely related fire blight pathogen by testing in a laboratory. *E. pyrifoliae* is only known to affect Nashi pear (*P. pyrifolia*) and European pear (*Pyrus communis*), whereas *E. amylovora* has a broader host range.

Where is it found?

The black stem blight pathogen was first detected in Nashi pear orchards near Chuncheon, South Korea in 1995. The disease has not been reported to occur in other countries.

Reporting

Growers may report suspected exotic pests to the Exotic Plant Pest Hotline (**1800 084 881**) or can directly contact their relevant state agriculture or primary industries department.

To minimise the risk of disease spread, samples should not be moved until they have been checked by an expert.

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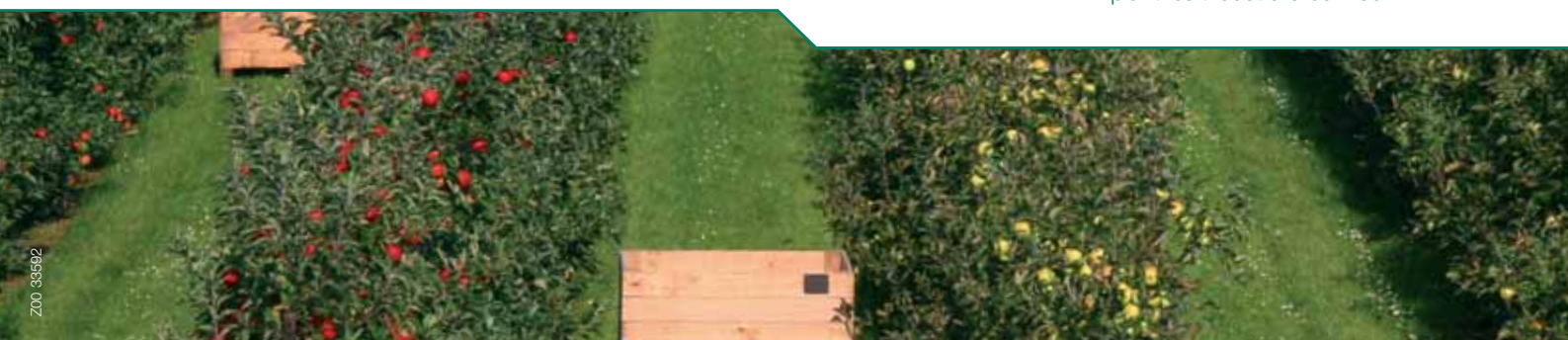


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