



**PLANT
PASS**®

THRIVING PLANTS FOR AOTEAROA NEW ZEALAND

**Identifying pests
and pathogens**

0 cm

1 cm

2 cm

3 cm

4 cm

5 cm

6 cm

7 cm

8 cm

9 cm

10 cm

11 cm

12 cm

13 cm

14 cm



THRIVING PLANTS FOR AOTEAROA NEW ZEALAND

This booklet identifies some of Aotearoa’s plant biosecurity risks. These threats would be disruptive to nurseries, supply chains, the environment, economy and our way of life. We all have a role in helping stop the spread of pests and diseases in New Zealand.

The Plant Pass team have created this simple visual booklet that makes it easy to identify a pest or pathogen and what to do if you find them.

For more information contact the Plant Pass team at office@plantpass.org.nz

Disclaimer

While the Scheme’s objective is to allow certification of plant producers and confidence that plants they produce have been grown under conditions of high biosecurity risk and hazard management, there remains the possibility a proportion of plants may contain biosecurity pests. Plant Pass and its partners accept no liability for claims regarding the presence of pests in any plants produced by registered and/or certified producers. While the objective of the Scheme’s standards and guidance is to minimise the potential risk pest, no party can guarantee that adherence to these standards and guidance will reduce such risk to zero.

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If you suspect an exotic pest or disease, photograph it, catch it (if it is safe to do so) and report it to Biosecurity New Zealand on 0800 80 99 66 or online at www.report.mpi.govt.nz/pest

Tomato red spider mite

– *Tetranychus evansi*

Description

There are a few red mite species in New Zealand already. Identification requires an expert (acarologist). Lots of webbing is the most obvious sign that the tomato red spider mite is present. This mite got its name because it eats tomato plants and is red. It makes silk webbing to protect itself and its eggs like some spiders do.

Impacts

The tomato red spider mite doesn't just feed on tomatoes. Other known hosts include:

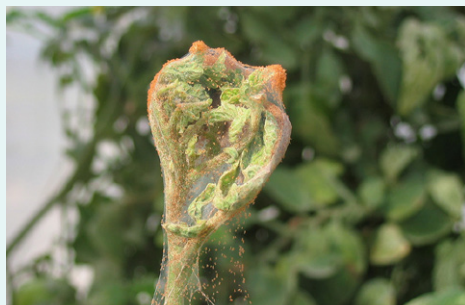
- potatoes, kumara, eggplants, and beans
- ornamental plants (roses and orchids)
- weeds (shepherd's purse, cleavers and fat hen).

In large groups, they can mummify plants, wrapping them up in silk webbing. They will feed on the plant until it dies.

The mite multiplies quickly and can be difficult to control. Many mite species can quickly become resistant to pesticides, which poses challenges for controlling this pest.

How it spreads

When they start running out of food, the mites gather at the top of a plant and make small balls of silk, containing many mites and eggs. These balls can drift some distance on light winds. The balls can also stick to animals and people.



Images source: Alain MIGEON and Franck DORKELD (2019) Spider Mites Web: a comprehensive database for the Tetranychidae. Available from <https://www1.montpellier.inrae.fr/CBGP/spmweb> (Accessed 29/05/2024)

If you think you've found this mite, catch it, take a photo and call the Biosecurity New Zealand hotline on 0800 80 99 66 immediately.

Brown marmorated stink bug

– *Halyomorpha halys* (BMSB)

Description

Adult BMSB are a brown “shield” shape and about the size of a 10-cent coin.

The easiest way to identify them is from the white bands on their antennae and alternating black and white markings on the abdomen. Its underside is a white/tan colour.

Stink bug eggs are light green, shaped like barrels, and are usually in clusters of 20 to 30.

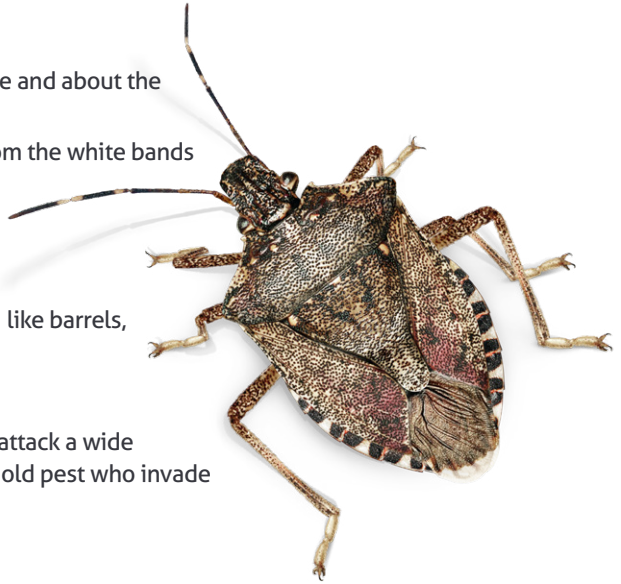
Impacts

BMSB threatens our economy as they attack a wide range of crops. They are also a household pest who invade homes and sheds in mass numbers.

How it spreads

BMSB can hitchhike in luggage and deliveries. They can hide in cracks and crevices in imported goods, and in passengers’ luggage.

The active season for BMSB is September through to April but in the winter months BMSB are likely to overwinter and hide in vehicles and machinery and may be found on imports of these.



Currently we do not have BMSB in Aotearoa and want to keep it that way.

If you think you've found this exotic pest, catch it, take a photo and call the Biosecurity New Zealand hotline on 0800 80 99 66 immediately.

Lilly pilly beetle – *Paropsides calypso*

Description

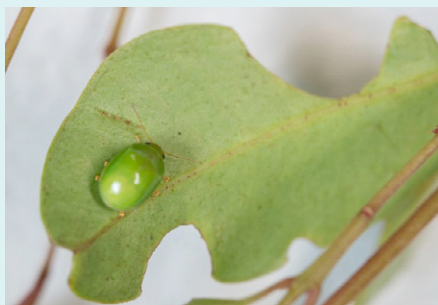
The adult beetle is shiny, bright green and 5mm to 9mm long. Larvae range from 1mm to 10mm, are pale green and can have a reddish tinge.

Impacts

Lilly pilly adult beetles and larvae feed on leaves of *Syzygium*, a genus of flowering trees and shrubs in the myrtle family (Myrtaceae), including popular hedging plants commonly known as lilly pilly. The beetles can completely strip the foliage of a plant.

How it spreads

There are several introduced species of *Syzygium* in New Zealand grown as ornamentals and hedges that lilly pilly beetle feed on. These plants are commonly called lilly pilly, monkey apple, scrub cherry and brush cherry. Being a leaf beetle, larvae may crawl on stems and leaves or drop on the ground before pupation, whereas adults are more likely to fly.



Look for leaves with signs of feeding damage. The beetles and larvae will be on the underside of the leaves. Also look for damage on new growth, especially leaf notching (crescent shaped "bites" out of leaves). Report any findings at www.inaturalist.org

Fall armyworm – *Spodoptera frugiperda*

Description

Fall armyworm (FAW) is a moth that can feed on over 350 plant species.

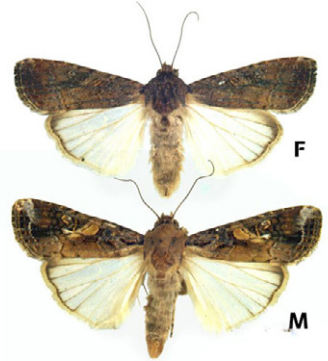


Eggs – laid in clusters of 100 to 300 on the underside of leaves and covered in a layer of white–greyish hairs, which make them look furry or mouldy.



Larvae – a dark head with an upside down, pale Y-shaped marking, and four dark spots aligned in a square on the second to last body segment.

FAW moths have brown-grey forewings and cream-coloured hind wings. Adult moths are nocturnal and most active during late summer and early autumn.



Impacts



First sign of FAW infestation is usually pin hole-like feeding marks by new larvae. As larvae grow, feeding will result in large, jagged holes across the leaf. Late-instar larvae may burrow into ears of corn and feed directly on kernels.

How it spreads

Adult FAW moths are strong flyers and will travel hundreds of kilometres on wind. The larvae can also be spread in cut flowers, fruit, and vegetables.

Growers should look out for FAW on their properties to help with the long-term management of the pest.

If you suspect FAW on your property, contact your crop manager or industry group for the actions to take and advice on the best management options for your crops. Contact the Foundation for Arable Research (FAR) if you have questions about the FAW long-term management programmes. Email FAR at far@far.org.nz

Granulate ambrosia beetle

– *Xylosandrus crassiusculus*

Description

The adult beetles have squat, cylindrical bodies, are brown reddish in color and 2mm to 3mm long. Larvae are smaller than adults and translucent-white.

A tell-tale sign of presence is distinctive protrusions of frass (compacted sawdust) from bark that look like toothpicks. They are caused by the beetles pushing frass out of tunnels bored into the trees. Other symptoms include sap oozing from the tunnel entrances and branch dieback.

Impacts

The beetle is known to damage a wide range of broadleaf trees, including horticultural species. The beetle causes two types of damage: firstly it can weaken or kill living trees. Secondly, it can cause serious damage of stored lumber by mass colonisation of the dead wood before it is processed.

In trees, the action of female *X. crassiusculus* beetles boring in wood and introducing fungus can cause a decline in tree health. An infestation can cause wilting and dieback of the tree, and may even cause death of nursery plants, saplings and trees. Because this beetle attacks a wide variety of plant species, it can become an abundant pest in urban, agricultural or forest areas.

How it spreads

Ambrosia beetles can spread in wood packaging material, sawn wood and logs, and adult females fly to new trees when infestations are very heavy.



Top, side, bottom view of adult female granulate ambrosia beetle. Image: Emma Scheltma, MPI PHEL Impacts.



Distinctive protrusions of frass.

If you see the beetle (or any sign of frass) on a tree, take a photo and call the Biosecurity New Zealand hotline on 0800 80 99 66.

Pierce's Disease – *Xylella fastidiosa*

Description

Xylella fastidiosa goes by many names, such as **Pierce's disease** in grapes, **olive quick decline syndrome**, **citrus variegated chlorosis** and **bacterial leaf scorch**.

Scorched leaves are a sign of some other plant diseases already present in New Zealand. Plants infected with *Xylella* can show:

- scorched leaves
- browning
- loss of leaves
- stunted shoots
- reduced fruit size
- over time, dieback and death of the plant.

Impacts

The bacterium can infect hundreds of different plants, both natives and economically important crops. It could cause very serious damage.

Overseas, *Xylella* has caused devastating diseases in crops like grapes, olives and citrus. These are important to New Zealand's economy.

How it spreads

Xylella is spread locally by infected insects like sharpshooter and spittlebugs when they move to a new plant after feeding on a diseased one. It could travel internationally on infected plant material. Biosecurity New Zealand has strict measures in place to limit the chances of infected nursery stock or insects coming through the border.



Xylella fastidiosa on olive tree. Image: Dr Luciano Rigano.

Currently
we do not have
Xylella fastidiosa
in Aotearoa and
want to keep it
that way.

If you find unusual signs of leaf scorch on host plants, take a photo and call the Biosecurity New Zealand hotline on 0800 80 99 66.

The pathogen that kills kauri

– *Phytophthora agathidicida* (PA)

Description

Phytophthora agathidicida (PA) is a soil-borne pathogen that attacks kauri trees, causing the fatal condition known as kauri dieback disease.

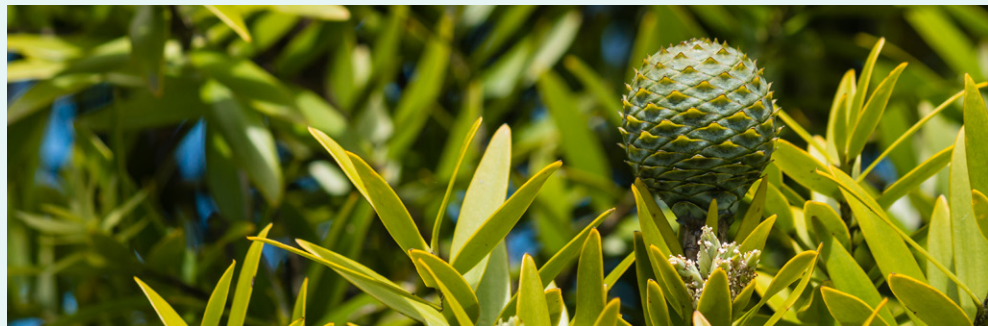
Impacts

The PA pathogen infects kauri trees through their roots and gradually starves them to death. There is no proven cure for PA pathogen infection, so reducing the spread of the pathogen is critical for protecting healthy kauri.

Rules for growing kauri

In August 2022, the National Plan for Kauri introduced strict protocols for the growing and production of kauri.

All kauri plants or trees must be grown according to a kauri plant production plan if they are going to be moved off the property from which they were grown. Nurseries that are Plant Pass certified to the Plant Pass Core Standard and the PA (Kauri) Schedule, automatically comply with this rule.



You must follow the rules of the National Plan for Kauri if you are growing kauri. Cases of clear, substantial or continued non-compliance with the rules will be subject to prosecution. For more information visit: www.kauriprotection.co.nz/national-plan/growing-kauri

Myrtle rust – *Austropuccinia psidii*

Description

Myrtle rust is a serious fungal disease that affects plants in the myrtle family. Look out for symptoms of myrtle rust, including:

- bright yellow powdery eruptions appearing on the underside of the leaf (young infection)
- bright yellow powdery eruptions on both sides of the leaf (mature infection)
- grey, 'fuzzy' spore growth on undersides of leaves
- some leaves may become buckled or twisted and die off.



Impacts

Myrtle rust affects native myrtle plants in New Zealand like pōhutukawa and rātā, mānuka and kānuka, ramarama, and swamp maire.

It also impacts some common garden plants like bottlebrush and lilly pilly and exotic plant species such as feijoa, guava and eucalyptus. It has spread across the North Island and the top of the South Island.

How it spreads

Myrtle rust spreads easily through wind, insects, birds, machinery, and even people. Many native species depend on these plants for food and shelter, making it crucial to report any sightings of myrtle rust.

It is important to understand where myrtle rust has spread to and where it is active. If you suspect you have found the disease:

- Take a clear in-focus photograph and submit the photograph to iNaturalist: <https://inaturalist.nz>
- Make sure you label your finds as myrtle rust, noting what host plant it has been found on. This supports New Zealand researchers to track and understand the disease. Further practical resources are available on the myrtle rust website, including management, training and identification: myrtlerust.org.nz

Pine pitch canker – *Fusarium circinatum*

Description

Pine pitch canker is caused by a highly virulent fungal pathogen, *Fusarium circinatum*.

- The wood under affected bark is amber-coloured and resin-soaked.
- Branches die back, leaving brown needles.

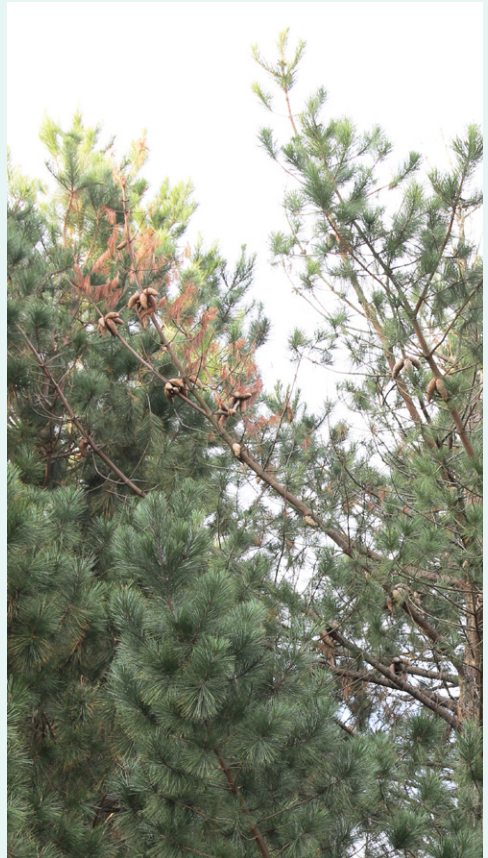
This disease is not present in New Zealand. Help keep pine pitch canker from establishing here by learning what to look for.

Impacts

This fungus causes dieback in pine trees, including radiata pine, which is central to our forestry industry. The disease can kill seedlings and cause adult trees to lose their entire canopy.

How it spreads

Contaminated seeds are the most likely way this fungus could arrive in New Zealand. Biosecurity New Zealand has strict measures in place to limit the chances of pine pitch canker making it through the border.



Mature infection of pine tree. Image: D Herron.

Currently we do not have pine pitch canker in Aotearoa and want to keep it that way.

Report suspected cases. If you've found unusual dieback in pines, photograph it, note location and landmarks, and call the Biosecurity New Zealand hotline on 0800 80 99 66.

Potato Spindle Tuber viroid (PSTVd)

Description

PSTVd is a pathogen that causes disease and potential loss of production, mainly in potatoes, tomatoes, pepinos, and capsicum. It can also infect some ornamental plants, including dahlias, chrysanthemums, and petunias. Many strains of PSTVd exist, with symptoms ranging from asymptomatic to severe infections.

Impacts

Depending on the strain, PSTVd can affect cropping plants, including potato, tomato, eggplant, and capsicum, reducing crop yields.

Initial introduction of the viroid into potato, capsicum, eggplant and tomato crops is mostly through infected seed. PSTVd is highly contagious.

How it spreads

PSTVd can be spread:

- directly through plant-to-plant contact with infected plant material
- indirectly through transmission on contaminated people, material and tools
- from infected seeds or pollen
- by the aphid *Myzus persicae* from plants already also infected with potato leafroll virus (PLRV).



Potato spindle tuber viroid in infected tomato plant.



Comparison of infected smaller potatoes with larger healthy potatoes. Source: EPPO Global Database.

If you suspect you've found signs of PSTVd in your crop, call the Biosecurity New Zealand hotline on 0800 80 99 66 immediately. You'll be given advice and if needed, instructions on taking samples for testing.

Pepino mosaic virus (PepMV)

Description

Pepino mosaic virus (PepMV) causes pepino mosaic disease in tomatoes, particularly greenhouse grown, and can infect other solanaceous plants including potatoes and eggplants.

There may be no significant yield loss or fruit impacts. Most commonly, PepMV damages the leaves, and occasionally the tomato fruit.

- Leaves around the 'head' of the plant may show dark spots and distortion. Lower leaves may have brown, necrotic lesions.
- Other leaf symptoms may be yellow spots which later develop into bright yellow patches on the leaf and 'bubbling' on the leaf surface.
- The tomato fruit skin can appear 'marbled' and this mottling or marbling may be more readily seen on large red tomato varieties.

Impacts

This virus can cause pepino mosaic disease in tomatoes which reduces yield and marketability of the fruit. Affected plants can show stunted growth or symptoms resembling hormonal herbicide damage. More common is damage to leaves and occasionally some mottling or marbling of the tomato fruit skin.

How it spreads

PepMV is spread on seed, stalks, and leaves and through plant to plant contact and propagation. It is also transmitted very easily on contaminated tools, hands and clothing. Bumblebees used as pollinators are also known to spread the disease.



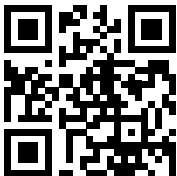
If you suspect you've found signs of PepMV in your crop, call the Biosecurity New Zealand hotline on 0800 80 99 66.





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