

Preparing the New Zealand citrus industry for exotic pest incursions

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NZ Citrus Industry

- ~330 growers
- 1,660 planted hectares
- commercial production – Gisborne (85%) and Northland (15%)
- smaller growing areas around Auckland, Bay of Plenty and Hawke's Bay
- ~30,000 tonnes per annum (all varieties)
- Primarily a domestic industry
- Lemons are the largest exported crop



NZ Citrus Industry: 2022-2023 season

Variety	Crop volume (tonnes)	Domestic volume (tonnes)	Export volume (tonnes)	Domestic NZ\$m	Peak supply
Satsuma mandarin	9,478	9,407	71	\$28.3	May - July
Navel Oranges	8,255	8,241	13	\$18.6	July - December
Yen Ben lemon	2,364	1,547	817	\$14.6	June - August
Meyer lemon	3,766	2,614	1,152		May - June
Other varieties (grapefruit, lime, tangelo, Valencia+non-navel varieties, non-Satsuma mandarins)	7,381	Non- satsuma – 3,507 Valencia+non-navel – 2,610 Tangelo – 484 Grapefruit – 427 Lime - 247	57	\$22.5	



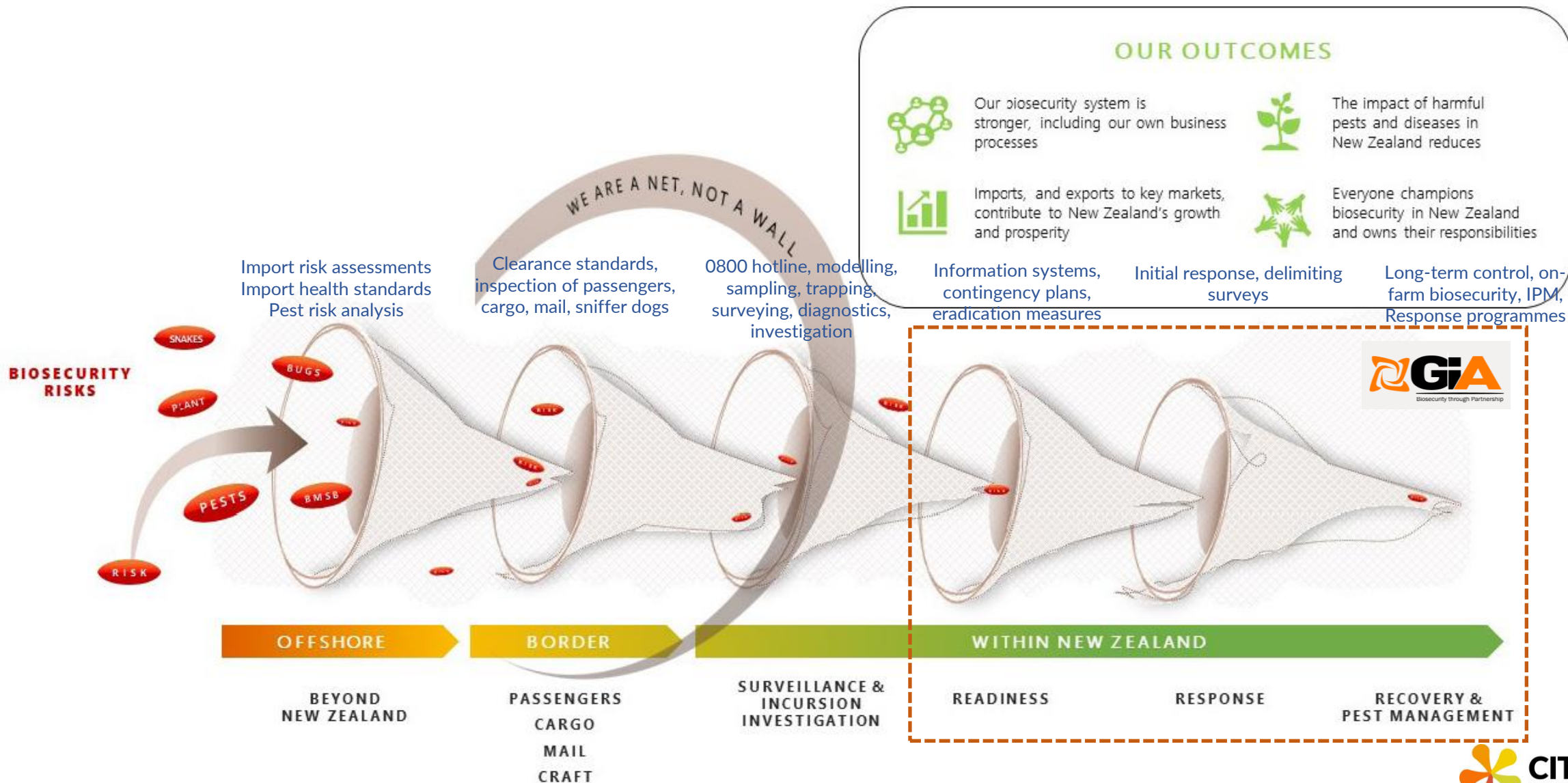
THE NZ BIOSECURITY SYSTEM

Hinaki nets – showing layers of risk management



Biosecurity New Zealand

Ministry for Primary Industries
Manatū Ahu Matua



REPORT THE UNUSUAL



CATCH IT



SNAP IT



REPORT IT

MPI exotic pest and disease hotline

0800 80 99 66

FIND PEST

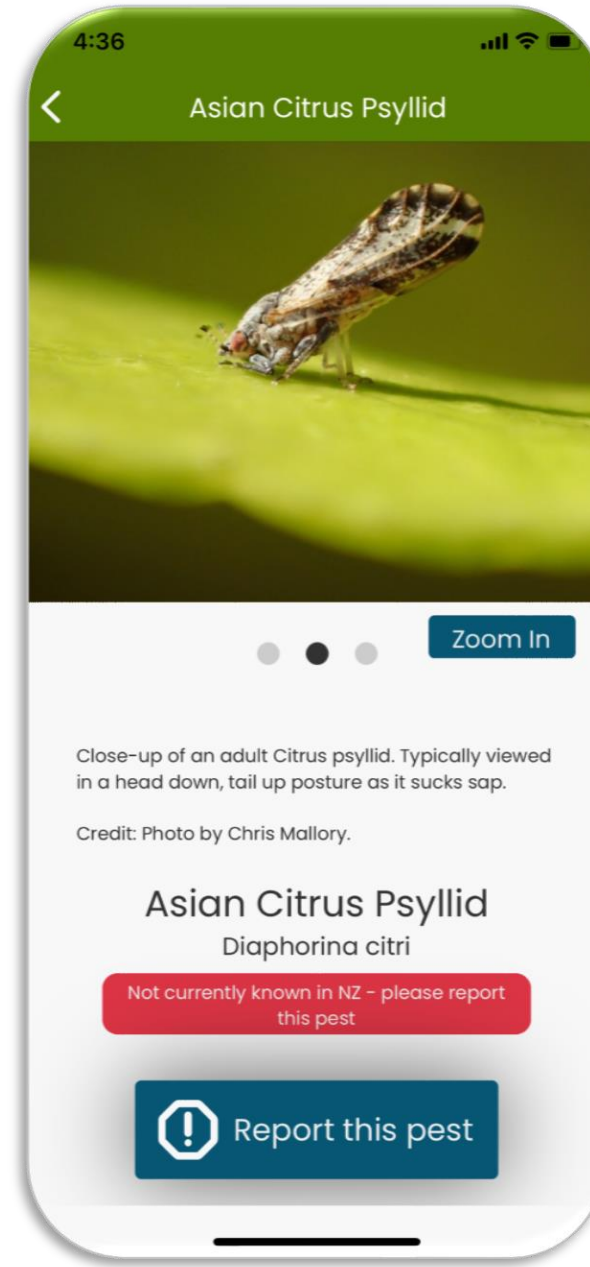
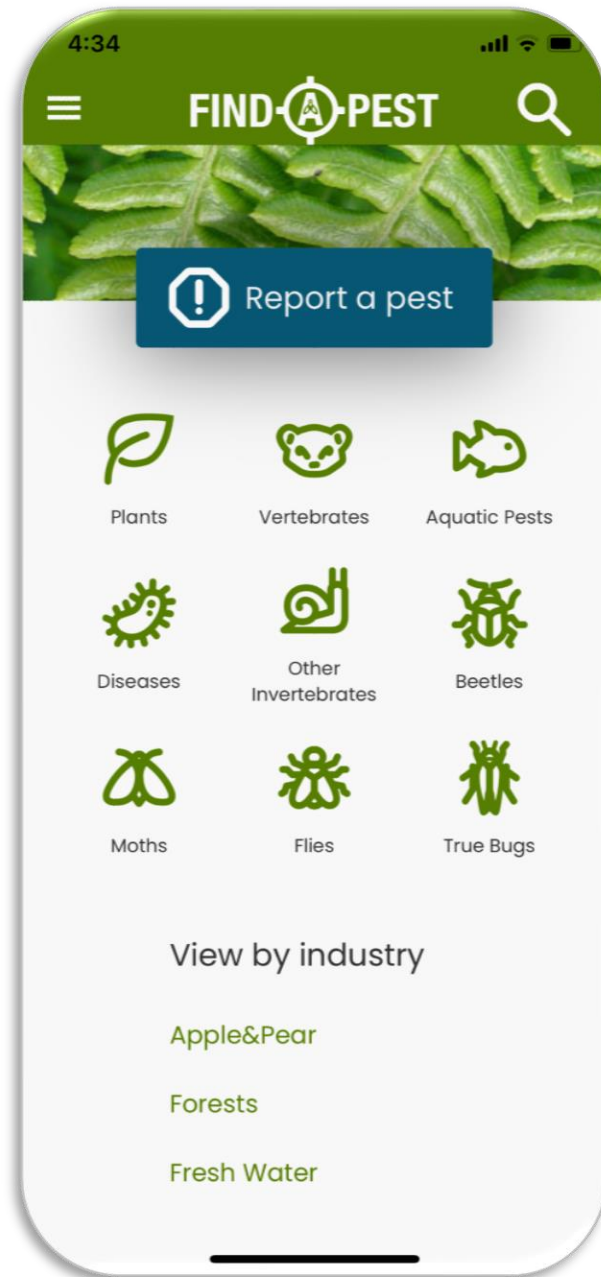


To download the app and learn more, head to:

www.findapest.nz

Help keep New Zealand free of new weeds and pests





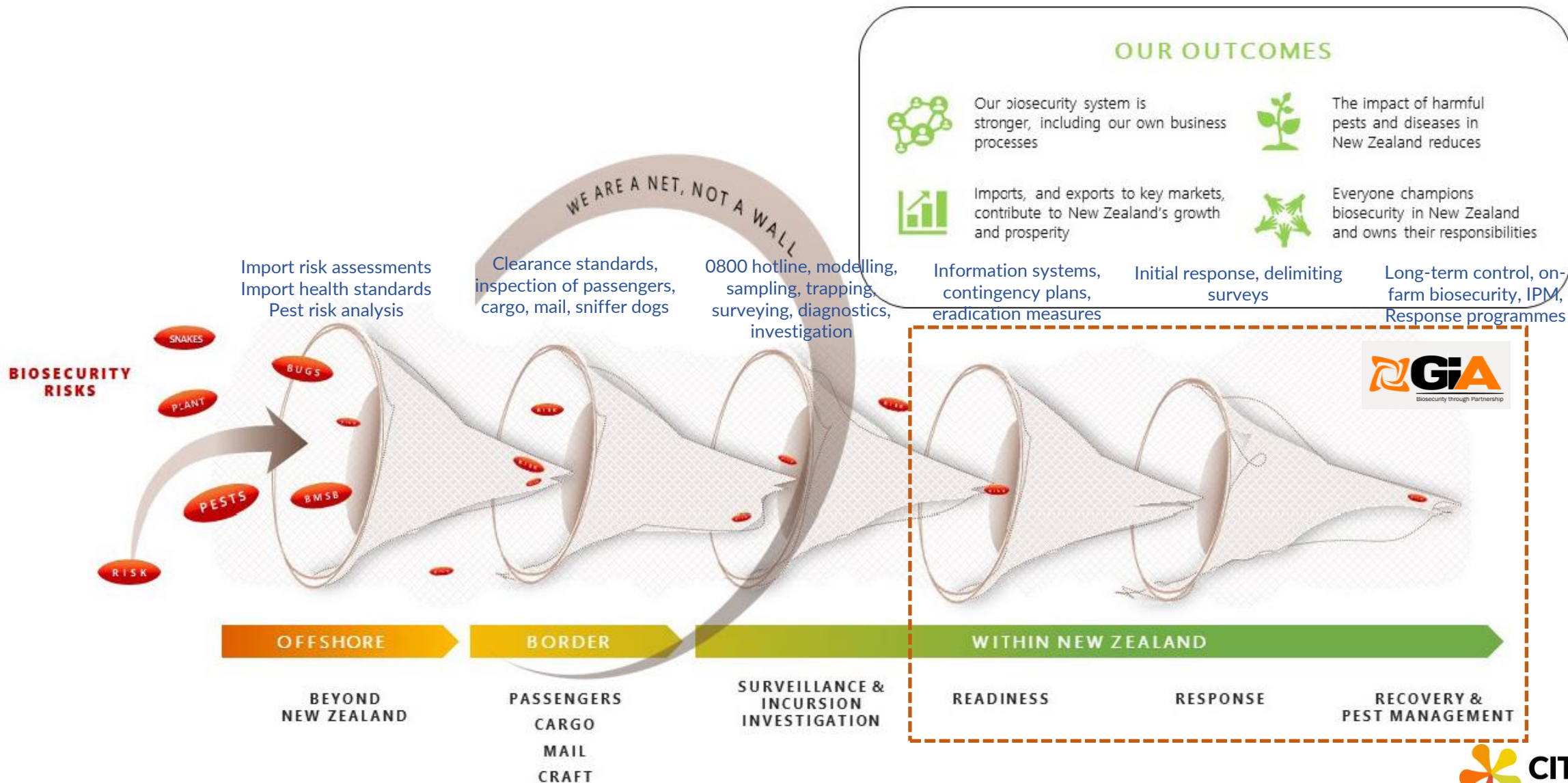
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NZ Biosecurity framework



Government Industry Agreement for
Biosecurity Readiness and Response

- **Partnership** between primary industry and government to manage pests and diseases that could badly damage New Zealand's primary industries, economy, and environment.
- Citrus NZ is a signatory to this GIA agreement.
- Joint decision-making and cost-sharing in **readiness and response** activities.

Biosecurity system engagement under the GIA



Ministry for Primary Industries
Manatū Ahu Matua



Biosecurity New Zealand

Tiakitanga Pūtaiao Aotearoa



Priority pests and diseases



Xylella fastidiosa / Glassy-winged sharpshooter



Queensland fruit fly

Sector risk organisms



Asian citrus Psyllid (ACP)



Huanglongbing (HLB)



Citrus canker

Biosecurity Readiness



- Risk assessments
- Global scans – changing distribution
- Study tours
- International conferences
- Collaboration

Biosecurity Readiness



Biosecurity New Zealand

Tiakitanga Pūtaiao Aotearoa



- Risk assessments
- Global scans – changing distribution
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PREPARING A FARM BIOSECURITY PLAN

GUIDANCE TO HELP MINIMISE THE RISK OF BIOSECURITY THREATS TO YOUR FARM OR ORCHARD

Preparing an on-farm BIOSECURITY PLAN

There are **5 KEY STEPS** to preparing & implementing a biosecurity plan for your farm/orchard



Ko Tātou
THIS IS US BIOSECURITY 2025

Horticulture
New Zealand



STEP 01

REVIEW PROPERTY MAP

It's useful to have a map of your property to help identify key features that can be factored into your biosecurity plan.

Mark these features on your property map:

- Entry and exit points
- Main roadways or parking areas and their proximity to production areas
- Known pest, disease and weed problem areas (hot spots)
- The best places to locate biosecurity zones – checkpoints, restricted access areas or wash zones.



STEP 02

IDENTIFY BIOSECURITY RISKS AND MITIGATING ACTIONS

This step involves considering the below biosecurity risk areas and identifying mitigating actions that are appropriate for your situation:

- Farm outputs
- Farm inputs
- People
- Vehicles and machinery
- Production and harvest practices

We have identified a number of common risks and management actions for you to consider. These provide a good starting point, however it's unlikely all will apply to your property, and there may be others that are unique to your site. We recommend you go through this guidance and identify risks relevant to your operation. Think about the suggested example actions and note how you plan to apply biosecurity actions on your property to best suit you. Mark key locations for mitigating actions on your property map where appropriate.



STEP 03

PRIORITISE

After you have identified the biosecurity practices that are relevant to your property, rank them in order of priority. If you can't implement them all at once, think about which ones can be done in the short term and which are longer term.

As a guide, short term activities can be in place quickly within the time and financial constraints of your business, while long term activities take more time and resources (financial or people) to implement.

Understanding the level of risk associated with an activity will help you prioritise actions that are most important to put in place on your property. When considering risk, the two factors to consider are likelihood (that something will happen) and impact (unwanted consequences).



STEP 04

COMMUNICATE EXPECTATIONS

Once you have noted the risks and biosecurity actions relevant to your operation, it is important that you communicate your expectations to those who work on or visit the property.

Consider what you expect from staff and visitors in terms of:

- Their actions
- Training
- Record keeping
- Reporting



STEP 05

IMPLEMENT

Once you have completed your biosecurity plan you can go ahead and implement your selected actions!



FINAL STEP

REVIEW

You will need to review your plan periodically to check progress towards your goals and make sure it's still fit for purpose.

CITRUS ORCHARD BIOSECURITY

ORCHARD BIOSECURITY IS ESSENTIAL FOR PROTECTING YOUR PROPERTY FROM INVASIVE AND EXOTIC PESTS, DISEASES AND WEEDS, AND MINIMISING THE IMPACT OF PESTS THAT HAVE ALREADY ESTABLISHED THEMSELVES IN NZ ORCHARD.



BE AWARE OF BIOSECURITY RISKS

INCREASE AWARENESS ABOUT PESTS AND DISEASE AND BIOSECURITY TO REDUCE RISKS ON YOUR ORCHARD

- Monitor and record the movement of people, vehicles, plants and production materials
- Raise awareness of biosecurity with regular staff training, and visitor and contractor induction
- Display posters and factsheets to help workers identify common pests and diseases
- Inspect trees regularly so that problems are identified early
- Be familiar with pests and symptoms of disease that affect your crops



KNOW YOUR CROP

KNOW THE USUAL APPEARANCE OF CROPS SO NEW OR UNUSUAL PESTS OR DISEASE SYMPTOMS CAN BE RECOGNISED

- Keep a look out for new weeds, flowers, insects or anything unusual that you haven't seen before
- Monitor crops for early warning signs of pest presence or disease symptoms to prevent them getting out of control
- Isolate new plant material away from production areas on arrival
- Inspect new or propagated plants to make sure they are pest and disease free before planting and monitor during growth.
- Use crop protection products according to GAP - Agrichemical misuse can lead to resistance and new pest incursions



USE HIGH QUALITY INPUTS

KNOW THE SOURCE OF ORCHARD INPUTS AND INSPECT BEFORE USE

- Use high quality plant material (rootstock, budwood), nutrients and fertilisers from reputable suppliers
- Know where organic materials, such as compost and mulch, have come from and inspect before use.



KEEP IT CLEAN

- PEOPLE, VEHICLES AND EQUIPMENT CAN SPREAD PESTS, DISEASES AND WEEDS
- RESTRICT MOVEMENTS AND MAINTAIN CLEANLINESS TO REDUCE RISK
- PRACTISE GOOD HYGIENE TO PREVENT PESTS FROM ARRIVING AND MOVING AROUND THE ORCHARD

DAILY

- Install signage to direct staff, visitors and contractors to designated parking areas, where to sign-in, sanitising and wash-down stations
- Provide washbasins, footbaths, sanitiser, vehicle and equipment washdown facilities
- Provide protective clothing (boot covers, disposable clothing, PPE) for higher risk areas
- Clean clothing and footwear on entering or leaving the orchard
- Keep vehicles and equipment free of soil, weed seeds and insects, and clean before moving to different areas of the orchard, and between properties

PRUNING AND HARVESTING

- Clean secateurs, snips, tools, and equipment before and after use
- Wash and sanitise hands before and after handling plant material, including picking fruit
- Clean picking bags and collection bins before use. Check they are free of soil, plant material or pests
- Clean and disinfect reusable bins when they are returned to the orchard
- Dispose of waste and reject fruit, plant material and food scraps promptly and away from production areas



KEEP RECORDS

KEEPING RECORDS MAKES IT EASIER TO TRACE-BACK AND TRACE-FORWARD, IF ANYTHING UNUSUAL IS SUSPECTED

KEEP RECORDS FOR:

- Visitors and contractors to the orchard
- Vehicle and equipment washing, and movements on and off the orchard
- Orchard inputs: nutrients, fertilisers, compost, mulch (sources, suppliers, purchase date)
- Plants, rootstock, budwood, (variety, purchase date, sources, planting location)
- Crop scouting and pest monitoring activities - keep written and photographic records of unusual pest or plant observations
- Crop protection use (spray diary)
- Certificates of authenticity (plant, scion)
- Laboratory test results, pest identifications

Keep records and retain documentation for at least 3 years

REPORT THE UNUSUAL



CATCH IT SNAP IT REPORT IT

MPI exotic pest and disease hotline
0800 80 99 66

Common signs of pest presence or plant disease

- Stem or leaf with
- Leaf chlorosis or wilting
- Puncture wounds, chewing marks or leaf mines
- Mildew, indicated by powdery growth on leaves
- Reduced crop size or yield
- Decayed leaves, stems, fruit
- Deformed fruit



Reduce the risk of biosecurity problems with regular work patterns

- Work with healthy crops before suspected diseased crops, younger crops before older crops
- Finish the day with 'dirty' tasks, such as tidy up and rubbish removal

USEFUL RESOURCES AND WHERE TO FIND THEM

"[Preparing a Farm Biosecurity Plan](#)", published by Horticulture NZ
[Biosecurity Manual for Citrus Producers](#), published by Citrus Australia
[Plant & Soil Use](#) from Apple Store or Google Play
[Citrus NZ](#) website for exotic pest factsheets

Build your own Biosecurity Plan to understand the biosecurity risks on your orchard so risks can be minimised, and biosecurity practices can be implemented. Use "Preparing a Farm Biosecurity Plan" published by Horticulture NZ as a guide.

EXOTIC PESTS FACT SHEET 1

Citrus canker (*Xanthomonas axonopodis* pv. *citri*)

What is it?

Citrus canker is a bacterial disease caused by a bacterium and produces lesions on the above-ground parts of citrus trees. The bacteria infect young, actively growing parts of the plant through wounds and openings on leaves, stems, and fruit.

What does it look like?

Citrus canker causes lesions on leaves, stems, and fruit. It can cause premature fruit drop, defoliation, twig dieback and general tree decline leading to tree death in severe cases.

What should I look for?

- Lesions on fruit begin as pin-point tan coloured blemishes which expand into brown to grey spots approx. 2-10 mm in diameter and have a yellow halo. The edges of the lesions have a watery or oily appearance and become scabby with age.
- Lesions develop on both sides of the leaf and are raised and rough. These lesions can be seen or felt on both sides of the leaf.



Citrus canker infected fruit, stems and leaves.
Timothy Shubert, Florida Department of Agriculture and Consumer Services, Bugwood.org



Thick and spongy lesions on citrus leaves.
Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org

If you see any unusual pests or plant symptoms, call MPI



EXOTIC PESTS FACT SHEET 2

Huanglongbing (*Candidatus Liberibacter*)

What is it?

Huanglongbing (HLB), also known as citrus greening, is a bacterial disease which is transmitted by the Asian and African citrus psyllids. The disease can affect all citrus and leads to tree decline and death.

What does it look like?

The symptoms of HLB vary between citrus species and varieties but common symptoms are yellowing of leaves, blotchy mottled leaves, small lopsided fruit, and asymmetric leaf development. The disease can cause dieback of branches, unseasonal and heavy flowering on diseased branches, and out-of-phase flushing. The tree eventually goes into decline and dies.

What should I look for?

- Fruit often has an irregular, lopsided shape and the inside flesh can also be irregular. The fruit can be small, hard and bitter-tasting, and have dark, aborted seeds. The fruit can stay partially green or poorly ripen, hence the term 'citrus greening'. There can also be excessive fruit drop.



Symptoms of citrus tree dieback.
Florida Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Bugwood.org

If you see any unusual pests or plant symptoms, call MPI

- Stems can also develop lesions that have a crusty, tan coloured appearance.

How does it spread?

- The bacteria is spread rapidly by wind-blown rain and overhead irrigation and strong winds can carry it long distances.
- The bacteria can also be spread by infected plant material, people, and insects.

Where is it present?

Citrus canker is found in large parts of the Americas, and present in Europe. The disease is also present in tropical and subtropical areas. It was first reported in Queensland, Australia where it occurred in Queensland, and is currently under control.

- Leaves develop yellowing, or chlorosis and mottling. They also develop asymmetrically.
- Infected trees produce smaller, lopsided fruit.

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Why is it important?

EXOTIC PESTS FACT SHEET 3

Asian Citrus Psyllid (*Diaphorina citri*)

What is it?

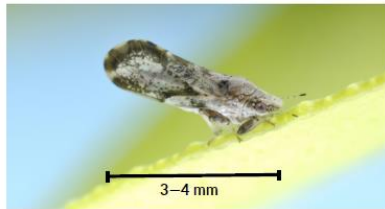
Asian citrus psyllid (ACP) affects all types of citrus. In addition to citrus, other hosts include *Murraya* species (curry leaf, orange jasmine) and other members of the *Rutaceae* family. ACP causes damage to the growing points of trees and can lead to dwarfing, defoliation and dieback, and affects fruit quality. ACP is also a vector for the bacterial disease Huanglongbing (HLB).

What does it look like?

Adult psyllids are 3-4 mm in length, mottled brown-beige in colour, and resemble a small cicada. Psyllid nymphs are up to 2 mm long and yellowish-orange in colour with red eyes. Adult psyllids lay their eggs on growing shoots, in leaf crevices, or at the base of newly-formed leaf buds. Eggs are 0.3 mm long.

What should I look for?

- Adult psyllids have a distinctive feeding stance where the head is lowered and the body is at a 45° angle to the leaf surface. Psyllids feed on the underside of leaves.
- Psyllid feeding causes severely curled leaves and deformed shoots. It causes young shoots to die and dramatically slows the growth of young trees. Heavy psyllid infestation can cause flower and fruitlet drop, and dieback.



Asian citrus psyllid adult.
Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org

- The psyllid excretes honeydew and a waxy substance which promotes the growth of sooty mould.
- Psyllid nymphs thrive on new vegetation. Psyllid populations are lower when plant growth is not active.
- Because the psyllid is a vector for HLB, symptoms of HLB may also be seen, such as leaf yellowing or chlorosis, and asymmetric development of leaves and fruit.

How does it spread?

- Adult psyllids are known to move frequently between host plants searching for new growth. They can leap and may fly short distances. Wind currents can spread the psyllid over long distances.
- The movement of egg or nymph infested plant material can spread the psyllid over longer distances and between countries.

Where is it present?

Asian citrus psyllid is a native of southern Asia in tropical and subtropical regions. It is now present throughout Asia, Middle East, East Africa, North, Central, and South America. In the Pacific, it is present in American Samoa, Guam, Northern Mariana Islands and Papua New Guinea. It has been present in the Northern Territory of Australia but was eradicated.



Asian citrus psyllid nymph.
Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org



Why is it important?

Psyllid infestation slows tree growth and leads to flower and fruitlet drop which reduces fruit yield and quality. The fruit lacks juice and taste, and is unsaleable. The psyllid is also a vector for HLB which also affects fruit quality and yield.

How can I protect my industry?

Check your citrus orchard frequently for the presence of new diseases and unusual symptoms. Make sure you are familiar with diseases common in your industry so you can recognise something different.

Where can I get more information?

For more information go to: www.citrus.co.nz
Email: info@citrus.co.nz



Asian citrus psyllid (nymphs and adults) on a plant. Waxy excretions on the stem are visible.
U.S. Department of Agriculture, Flickr/Creative Commons

If you see any unusual pests or plant symptoms, call MPI EXOTIC PEST AND DISEASE HOTLINE 0800 80 99 66



Operational Guidelines - Huanglongbing
Surveillance

Version no. 1.0

Ministry for Primary Industries
Manatū Ahu Matua



Operational Guidelines for Asian Citrus Psyllid
Movement Control

Version no. 1.0

Operational Guidelines –
Huanglongbing Host Removal and
Destruction

Version no. 1.0

Operational Guidelines - Asian
Citrus Psyllid (*Diaphorina citri*)
Surveillance

Version no. 1.0

Citrus Psyllid (*Diaphorina citri*)
Treatment

Version no. 1.0

Operational guidelines

- Asian citrus psyllid movement control
- Asian citrus psyllid surveillance
- Asian citrus psyllid treatment
- Huanglongbing host removal and destruction
- Huanglongbing surveillance

Biosecurity New Zealand

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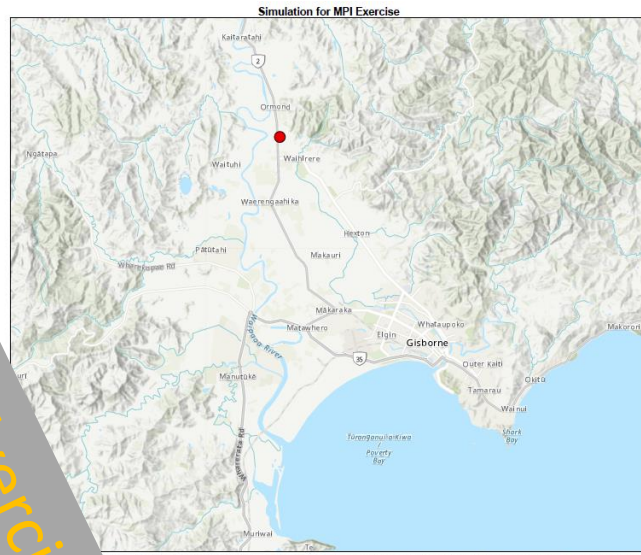


Response training

Scenario:

- At approx. 1020hrs, a citrus grower on the northern outskirts of Gisborne noticed that some of their citrus fruit tree leaves are covered in sticky honeydew and a black soot.
- The orchard staff suspected that the fruit may be infested with Asian citrus psyllid (ACP) and so MPI was notified on the Pest and Disease Hotline.
- MPI's Incursion Investigators (IIs) commenced an investigation.
- Tests have confirmed that the fruit at this property has been infested with ACP and that the insect is carrying HLB.
- A response has been initiated, with a NCC (National Coordination Centre) has been set up in Wellington. Operational field teams have been dispatched to Gisborne and an RCC (Regional Coordination Centre) will be established.
- You have been chosen to be part of the NCC and have been set tasks to initiate the response action, through the response Initial Action Plan.
- Neighbouring properties are not aware of the presence of ACP but will need to be informed if tracing is to commence.
- Movements from the property have been halted until further advice from the NCC and citrus industry.

Exercise Hua Tairāwhiti scenario





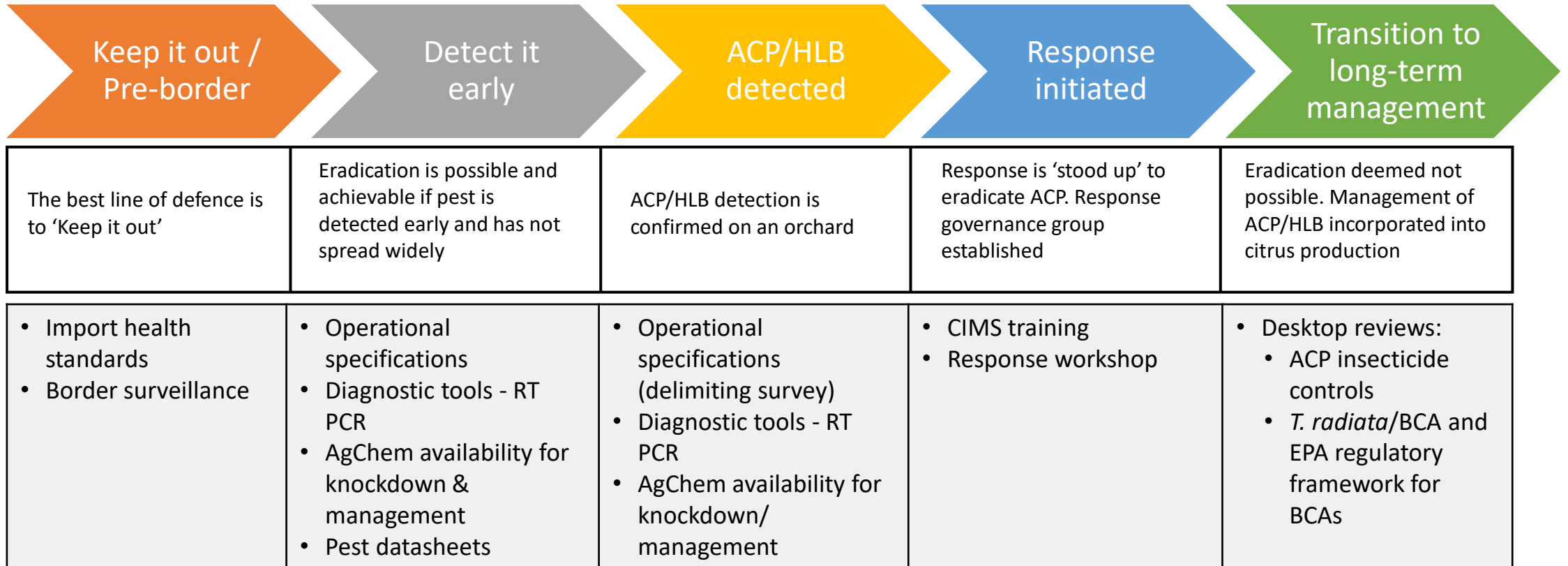
Where should the NZ citrus industry focus biosecurity effort?

- * Comms and engagement
 - grower and public awareness
- * Surveillance
 - non-crop hosts - *Murraya* species,
 - risk-based modelling
- * Biological control
 - *Tamarixia radiata*
- * Response planning
 - movement controls
 - treatments
 - testing
 - trapping

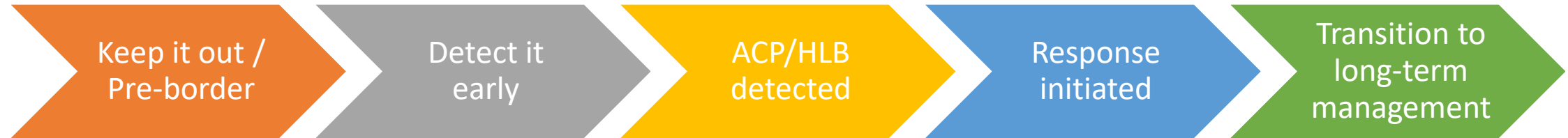


Citrus industry biosecurity workplan – ACP/HLB

Biosecurity Incursion Continuum



Where are the gaps?



Understand pest risk to New Zealand.	Improve wider awareness of growers, crop monitors, nurseries, and public to ACP/HLB threat.	Communicate to growers who need to know what to do if ACP is detected e.g quarantine zones and movement controls, treatment options.	Improve CNZ Board awareness of a response and response governance.	Insecticide/BCA tools available for management and control. Changes to citrus production practices.
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Work programme

Keep it out /
Pre-border

- ✿ Risk and readiness reassessment of priority pests for NZ citrus.
- ✿ Continue annual global scan for ACP/HLB/Canker.

Detect it
early

- ✿ Orchard management calendar – ACP monitoring.
- ✿ Crop scouting resource.
- ✿ Tree tags – garden centres.

ACP/HLB
detected


- ✿ Translate Operational Guidelines to grower friendly resources.
- ✿ Communication plan and information resources.

Response
initiated

- ✿ Response training for CNZ.

Transition to
long-term
management

- ✿ Evaluate BCA controls through NZ EPA HSNO process.
- ✿ Agrichemical toolkit for ACP control.

- 
- ✿ Citrus NZ and government (GIA) working together for biosecurity preparedness.
 - ✿ Biosecurity workplan.
 - ✿ Citrus NZ leads the development of grower-focused resources.
 - ✿ Aim for the citrus industry to be prepared and respond to pest incursions.



