

PUKA HAUMARU KOIORA

NURSERY BIOSECURITY GUIDE

2024

Cover Image

Te Mara o te Wairākau, 2023 (detail)

Angela Kilford (Te Whanau A Kai, Ngāti Porou, Ngāti Kahungunu)

Ecoprints on wool, embroidery thread

Photo: Amarbir Singh

Textile artist Angela Kilford seeks to raise the awareness of the effects of fungal disease myrtle rust by exploring the dichotomy between beauty and disease. Using the eco-print technique of steaming leaves in bundles of cloth, she created direct prints of leaves from myrtle species pohutukawa and manuka.

During her research into myrtle rust, Kilford learned of a fungus gnat whose larvae were observed feeding on the rust spores. Over a series of community workshops held in Pōneke, Whangārei and Tāmaki Makaurau, people were invited to embroider larvae and rust onto the eco-prints while discussing both the disease and its implications for the wider ecosystem.

This artwork was commissioned for research project Toi Taiao Whakatairanga, part of Ngā Rākau Taketake, funded by the BioHeritage National Science Challenge.

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KAUPAPA OF THIS GUIDE

Protection of indigenous biodiversity, in particular our taonga species, is a critical element in the restoration practice life cycle. Nurseries have a key role to play in the prevention and mitigation of pests and disease spread. Nurseries can be a place to raise awareness and provide education to staff, volunteers and the wider community.

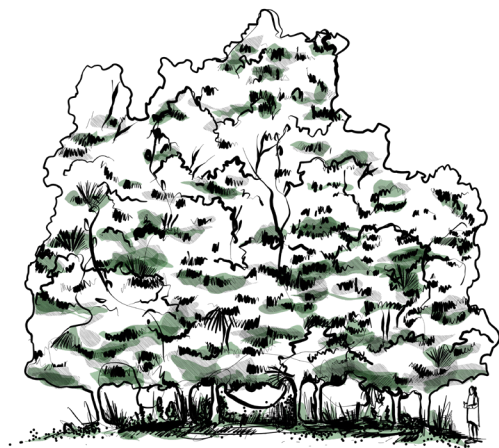
This guide aims to support kaitiaki and community nurseries with this biosecurity work, providing guidance on how to identify biosecurity risks, how to create

your biosecurity nursery management plan and the methodology with which to carry out this work.

An important step in both prevention and mitigation of issues is to keep plants in good health throughout all stages of plant growth, strong healthy robust plants have a greater chance of fighting off the attack of common nursery pest and diseases. This guide aims to help with recognising the difference between mechanical damage and biological/disease issues.

ROLE OF NURSERIES IN RESTORING AND PROTECTING NGAHERE

Arrows show movement of potential biosecurity risks

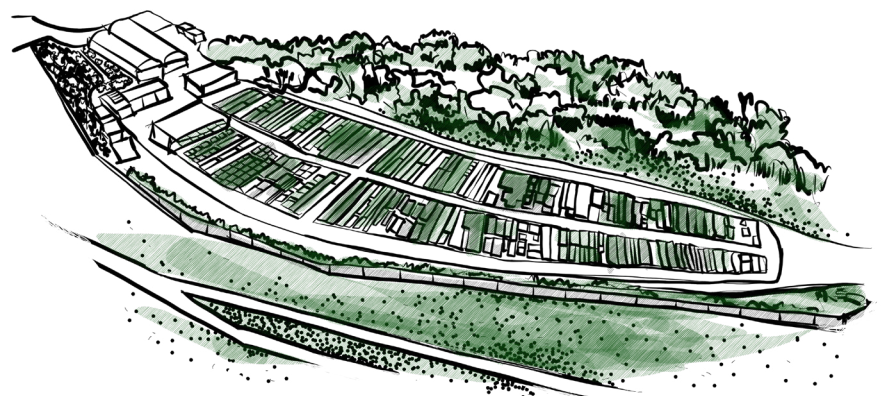


REMNANT NGAHERE / REPO

When remnants are in close proximity to restoration / landscape

Seed harvesting equipment

Plant material



NURSERY

Incoming materials - soil, pots

BIOSECURITY / PEST MANAGEMENT IN THE NURSERY

A biosecurity plan will help to prevent plant loss, disease spread and will contribute to responsible practice within nurseries towards the control, mitigation and elimination of environmental pests.

Pest management is an ongoing activity for native plant nurseries and requires time and commitment to manage (re) occurring issues.

For biosecurity issues, prevention is always better than a cure. For issues that are difficult to fully prevent such as windborne rust, it is a matter of early detection, containment and mitigation.

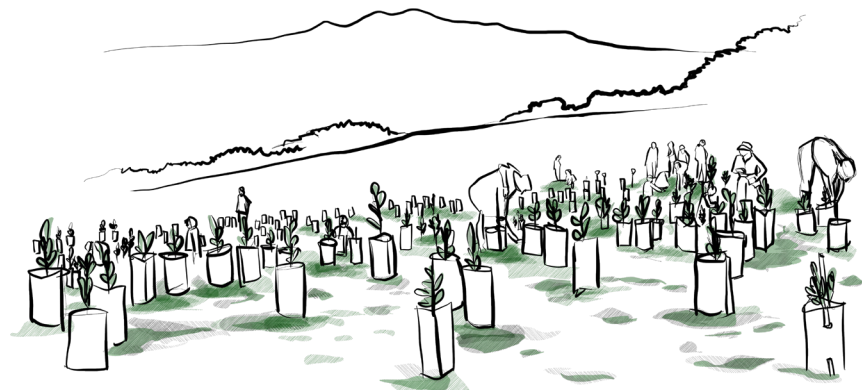
Some common reasons for pest management are:

- Increases survival rate of plants grown
- Reduces waste - seeds, time, resources
- Increases quality of plants grown
- Increases ability to grow rare / threatened species through improved environments

Keeping good pest management records enables the:

- Ability to share pest management knowledge with staff internally as well as externally with other nurseries and biosecurity agencies
- Ability to track your pest management journey - record keeping lets you see how you are doing

sites, weed seeds can travel to remnant sites



RESTORATION /
LANDSCAPE SITE

Plants, soil & equipment to site

Plants, pots & equipment return

IDENTIFYING BIOSECURITY RISKS

The following diseases and pest animals are issues that can affect the whole nursery and the surrounding community. It is the responsibility of all people working in the nursery to be able to identify and understand these risks in order to avoid unnecessary damage to plant health. If left, management and elimination of these can be time consuming.

Nursery weeds that are left, while not necessarily killing nursery plants, can be time consuming to remove later, they can also inhibit water and food uptake of individual plants. Environmental weeds of note are moth plant, woolly nightshade, lilly pilly, and privets. Monitor the boundary for plantings that can't be eliminated such as hedges, and trim prior to seeding to prevent seed spread.

WHOLE NURSERY RISKS

These are risks that can affect the whole nursery and not just a specific area or species.

MECHANICAL DAMAGE

Mechanical and cultural growing environment damage includes placement of shade species in too much sun, or species with high sun requirements being shaded and growing trees faster than they naturally would e.g. boost feeding can cause split trunks). Species affected by light related stress include kawakawa which is often seen to be turning yellow-grey due to overexposure to sunlight. Harakeke will become long, leggy and weak in the shade, struggling to grow. Both of these conditions can be corrected early on by placement back in their ideal growing conditions. Wind, hail and frost damage may appear as burnt on one side, brown spots forming holes or damaged parts changing colour and wilting. This damage is isolated to the contacted parts of the plant only, and if protected from further wind and frosts the plant can recover when new shoots grow again. Record weather and inspect damage, which will appear immediately following weather events. No insects, mites or caterpillars will be present if the cause is mechanical damage by cold temperatures.

KAURI DIEBACK

Phytophthora agathidicida is a fungus-type pathogen which damages the tree's root system. It reduces the tree's ability to take water and nutrients from the soil and transport it throughout the plant. This is sometimes referred to as kauri disease. Prevent by ensuring clean shoes before entering areas with kauri present, isolating kauri plants in nurseries, not entering rāhui designated areas, providing clear signage, and reporting to the local regional council.



Mechanical damage - hail damaged pūriri



Mechanical damage - frost burned makomako



Nutrient deficiency shown in para



Kauri dieback - Phytophthora agathidicida

MYRTLE RUST

Myrtle rust is a wind-borne fungal disease that can infect taonga species such as mānuka, pōhutukawa and rātā. The disease causes bright yellow-orange powdery pustules on young leaves, shoots, fruits and flowers of plants in the myrtle family. Microscopic spores travel by wind, machinery, insects, birds, and people.

If you think you have detected myrtle rust, photograph it and upload it to iNaturalist for confirmation. Label it “myrtle rust” and note what host plant species it was found on. Follow these guidelines for removal.



Myrtle rust - Austropuccinia psidii

APHIDS

Aphids are small sap-sucking insects. Common names include greenfly and blackfly, although individuals within a species can vary widely in colour.

No external reporting is required, however internal reporting is important. Record frequency and intensity of infestation as well as what was affected and how you controlled it. Reducing or eliminating pesticide use will promote the presence of natural predators, and in turn help control aphids.



Aphids

MITES

Mites are small arachnids (eight-legged arthropods). Most mites are tiny, less than 1 mm in length, and have a simple, unsegmented body plan. On plants, they appear as tiny little specs usually clustered around the stem of the plant on the underside of the leaf. Mites thrive in hot conditions and may be more of an issue in greenhouses. You can limit exposure by changing the temperature by hoeing plants down and increasing airflow. Some infestations may require active management or a predator mite. This level of intervention is uncommon for native plant nurseries.



Mites

RAINBOW SKINKS

The plague or rainbow skink is native to Australia. They look similar to mokomoko (native skinks) but are smaller, and have one large scale on the top of their head, whereas mokomoko have two smaller scales. The rainbow skink is brown with an iridescent rainbow sheen.

Plague skinks reproduce rapidly - competing with mokomoko and other native fauna for food and habitat. Ensure there are no eggs when plants leave the nursery, particularly when plants are going into restoration projects for the establishment of mokomoko habitat.



Rainbow skink - Lampropholis delicata

SITE SPECIFIC RISKS

Risks within the nursery can be intensified depending on the area and specific conditions with which a pest may thrive. The following are risks specific to the propagation house.

SNAILS & SLUGS

Slugs and snails are an issue in the propagation house with new seedlings and also with small soft barked trees. They can damage both seedlings and mature plants.

They hide from the heat and sun during the day under plants, in decaying leaves, areas with weeds, piles of timber or rubbish. Keep weeds under control and remove any hiding places i.e. rubbish piles. Non-chemical slug and snail traps are a good control when strategically placed.

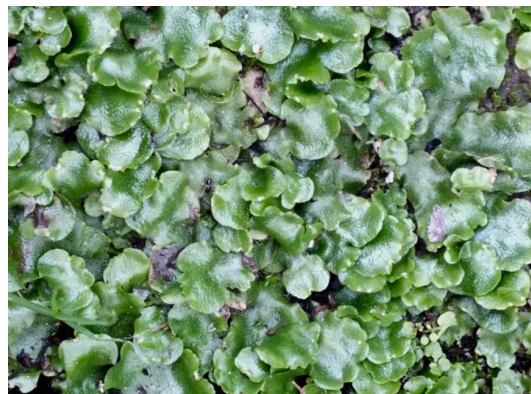


Snails & slugs

LIVERWORTS

Algae, liverworts and moss will grow on the soil surface of containers and are usually associated with compacted soil or poor drainage. They inhibit growth of young seedlings by forming a mat which obstructs soil absorption causing the pots to dry.

As liverwort thrives in damp conditions, improve drainage in containers, greenhouse and nursery facilities and avoid over-watering. Drip or micro irrigation can reduce the spread of liverwort when compared with overhead irrigation systems.



Liverworts

POWDERY MILDEW

The development of powdery mildew is influenced by environmental factors including temperature, relative humidity, light, and air circulation. Because these optimum conditions usually occur in mid to late summer, powdery mildew outbreaks are most common at that time. High humidity and overwatering promote growth of powdery mildew. The symptoms of powdery mildew are usually worse than the actual damage.



Powdery mildew

DAMPING OFF

Damping off is a disease of seedlings caused by several different fungi and fungus-like organisms. This disease causes emerging seedlings to collapse, often submerged in a mass of white fungal growth. It is particularly a problem when sowing seed indoors or under glass. Prevent damping off with good ventilation and regulating your irrigation in your propagation house to ensure your seedling trays are not too moist.



Damping off

RISKS SPECIFIC TO INDIVIDUAL NATIVE SPECIES

Individual species may have an associated organism that will have only a minor effect on the natural population and have managed to stay in balance in the wild. In an artificial nursery environment where young individuals have less defences, the impacts may cause damage that is harder to recover from.

KŌWHAI SPECIES: CATERPILLARS

Caterpillars can affect all species of kōwhai. Watch for caterpillars during summer through to early autumn. Caterpillars can be removed by hand for small plant numbers or by spraying an organic mixture of chilli and water.



Caterpillars on kōwhai

HARAKEKE: WINDOWERS AND NOTCHERS

All harakeke varieties are susceptible to windowers and notchers. Strong plants can overcome an infestation of windowers/window makers and notchers. Place harakeke in full sun on the hardstand in an area that has pathways between rows of plants to provide air flow.



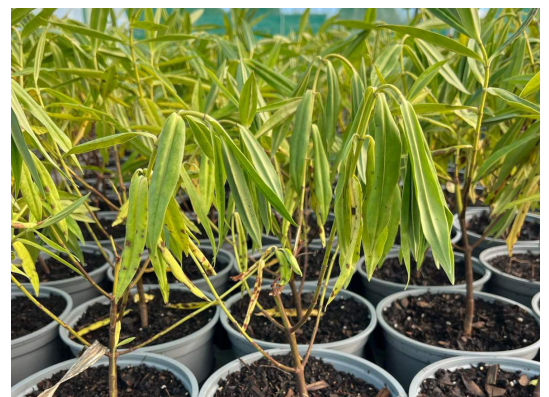
Harakeke damage by windowers and notchers

KOROMIKO: WILT AND DIEBACK (PHYTOPHTHORA)

Wilt and dieback can affect all species of koromiko. Phytophthora are fungi-like organisms that cause root rot disease causing plants to wilt and die. Can occur when roots sit in water for a prolonged period of time, check that the hard stand doesn't have a series of hollows that can happen when weed mat has been laid directly on grass/ soil base or uneven drainage material

Other Plants also affected by Phytophthora diseases

Akapuka, kapuka and Kauri Puriri, Karaka, Kahikatea and Pōhutukawa, Kawakawa.



Koromiko wilt

KARO & PŌHUTUKAWA: PSYLLIDS

Both native and introduced species of psyllids are present in Aotearoa. They are small sucking insects and are tiny in size, measuring 1–2 mm. They damage the underside of leaves, leaving bumps on the underside of species such as pōhutukawa and karo. Ladybirds can eat psyllids and in general it is good to have a healthy population of beneficial insects in the nursery.



Damage from psyllids on karo

NURSERY WEEDS / ENVIRONMENTAL PEST PLANTS

Weeds are plants growing where they are not wanted. In the case of nurseries, these weeds are growing within pots that may use up nutrients intended for the selected plant, be time-consuming to remove and must not be passed on to the next site that plants are being delivered to. Weed sources may be brought in with supplies, visitors and returned machinery.

NUTGRASS

Originating in North and South America, this exotic grass grows on the banks of rivers and away, with seeds easily dispersed by contaminated machinery. It is a common invasive species in nurseries and needs to be eliminated when found.



Nutgrass - Cyperus eragrostis

BLACK NIGHTSHADE

Black nightshade is a common weed species in nurseries and gardens. It spreads by birds eating its berries, with seeds being spread that way. Black nightshade flowers and seeds when it's very small and it's best to eliminate it before it reproduces. It is an annual and as such it can be pulled out before it sets its fruits/berries. Leave it to rot down on site. Note that the green berries are poisonous.



Black nightshade - Solanum nigrum

CLIMBING DOCK

Dock originates from South Africa and is a climbing perennial that invades habitats and bare, open sites. It spreads by wind, water, movement of soil and dumping of vegetation. Remove by digging out tubers and rhizomes and burn or dispose at a refuse station.



Climbing dock - Rumex sagittatus

CHICKWEED

Chickweed is a sprawling annual flowering plant originating in Europe. It is easy to weed by hand to remove.



Chickweed - Stellaria media

Note: Weeds that are less of an issue (and are even desired by some for certain properties) include: puha, dandelions and kikuyu; these are often found in nursery hardstands and on boundaries/grass verges.

BITTERCRESS

Originating in Eurasia, this flowering annual should be hand weeded, preferably before it sets seed.



Bittercress - Cardamine hirsuta

BOUNDARY WEED SEED SOURCES

The following are the main weed (environmental pest plant) species that can arrive in your nursery from outside parent plants. Windblown, bird dispersed and weed seeds from hedges from adjacent properties and the wider surrounding area increase weeding time and production costs for producing plants.

TREE PRIVET & CHINESE PRIVET

Both originating in China, these invasive small-to-large trees spread by birds, movement of soil and dumping of vegetation. Pull or dig out seedlings and leave to rot down on site.



Left: Tree privet - *Ligustrum lucidum*
Right: Chinese privet - *Ligustrum sinense*

MOTH PLANT

Moth plant is a rampant vine originating in South America. Its seeds spread by wind and it can impact both natural habitats and urban sites. Remove by digging or pulling out and dispose of seed pods in a way where they can't germinate.



Moth plant - Araujia hortorum

WOOLLY NIGHTSHADE

Originating in America, woolly nightshade is a shrub/small tree spread by birds, particularly by kererū. It can invade natural habitats as well as open or disturbed sites. Dig or pull out to remove.



Woolly nightshade - Solanum mauritianum

NURSERY PESTS

WHOLE NURSERY RISKS



KAURI DIEBACK

Will cause death and can be spread to wild populations. Prevent at entry points, identify, isolate and report.



MYRTLE RUST

Can cause death or disfigurement. Monitor Myrtaeae species, prevent movement of materials, identify, isolate and report.



APHIDS

Will reduce plant health, Identify and control where possible.

SITE SPECIFIC RISKS



SNAILS & SLUGS

Can reduce new seedlings cause high losses at seedling stage. Remove by hand, using traps and keeping surrounding site clear.



LIVERWORTS

Forms dense mats across surface of seed trays/small pots. Inhibits germination & plant growth. Remove when still at low density; baking soda helps for some species but not all.



POWDERY MILDEW

Can cause death or weakened plants. Reduce overhead watering in high humidity.

RISKS SPECIFIC TO INDIVIDUAL NATIVE SPECIES



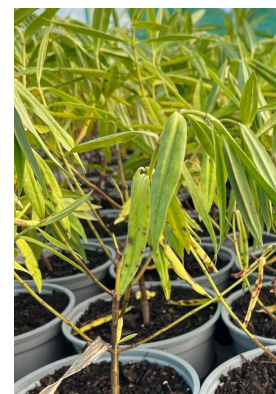
CATERPILLARS

Will eat plant material main new shoots. Manually remove, light shaking should displace or spray with soap and chill power in low dose



WINDOWERS & NOTCHERS

Two types of moth; the caterpillar stage can cause damage to blades leaving weakened. Keep the area around the base clean and trim any neighbouring ingrowth mature plants.



WILT & DIEBACK (P)

Symptom of lack of water or overwatering. Plants are covered by irrigation and pooling water.



Identify and treat with biological



MITES

Identify and treat with biological control where possible.



RAINBOW SKINKS

Will displace native stink populations. Identify and prevent further spread. Check for eggs on pot surfaces before plants leave the nursery.



W
d plants. Keep ventilated and
humid weather.



DAMPING OFF

Can cause new seedlings to fail at the stem. Keep ventilated and reduce watering at emergence.



PHYTOPHTHORA)

over watering. Check plants
that pots aren't sitting in



PSYLLIDS

Causes leaf distortion; can out grow psyllids if kept in optimal growing conditions.



BROWN MARMORATED STINK BUG

Not currently present in Aotearoa. Take a photo and report any possible sightings.

NURSERY PESTS

NURSERY WEEDS / ENVIRONMENTAL PEST PLANTS

TREE PRIVET & CHINESE PRIVET



Young seedlings are to be removed by the root, and older trees to be stump cut and pashed. Hedges to be retained should be pruned before seeding.

WOOLLY NIGHTSHADE



Can cause mass displacement of desired species if left to get out of control. Remove all young seedlings; trees should be cut and pashed.

BITTERCRESS



Seeds prolifically; removal required at the time of the first appearance to prevent seed dispersal phase. Ongoing removal is required.

CHICKWEED



Seeds prolifically; removal required at the time of the first appearance to prevent seed dispersal phase. Ongoing removal is required.

BLACK NIGHTSHADE



Can cause competition for nutrients and light. Remove at the time of first appearance.

NUTGRASS



Can displace native species in wild populations. Remove before setting seed; infestations should be eradicated.

MOTH PLANT



Vines to be removed by the root, and any older vines to be cut and pasted. All pods to be treated to prevent ripening and seed dispersal.

CLIMBING DOCK



Smothers other plants. Complete removal is required.

BIOSECURITY NURSERY MANAGEMENT PLAN

MAPPING YOUR JOURNEY & GOAL SETTING

Set biosecurity goals for your nursery and tohu that will help with monitoring how you are tracking with your goals. Tohu can be signs of wellbeing that may be seen or felt. Goal setting at the beginning of your nursery journey will help keep your nursery operating safely and ensure your growing environment is as healthy and disease-free as possible. Goals can be adjusted and adapted as time goes on and learnings occur.

MARAMATAKA

Planning ahead and refining when issues occur. Issues such as wasps will have a peak season over the hottest summer months, tracking your journey will show from year to year when these occur. Others present throughout the year with seasonal peaks may have higher activity at certain times of the month, such as low activity for possums during rain and higher following a period of rain that has just finished. Building this knowledge and connecting the biosecurity observations to plant seeding and growth will help form recognised patterns where damage may be prevented.

		Kauri dieback	Myrtle rust	Aphids	Mites	Rainbow skinks	Snails & slugs	Liverworts	Powdery mildew	Damping off	Caterpillars	Windowers & notchers	Wilt & dieback	Psyllids ¹	Weeds ²	Possums	Rats & mice ³	Wasps ⁴
Hōteke	Pipiri																*	
	Hōngoignoi																	
	Here-turi-kōkā																	
Kōanga	Mahuru													*	*		*	
	Whiringa-ā-nuku													*	*			
	Whiringa-ā-rangi													*	*			
Raumati	Hakihea													*	*		*	
	Kohitātea													*	*			
	Huitanguru													*	*			
Ngahuru	Poutūterangi																*	
	Paengawhāwhā																	
	Haratua																	

1. Psyllids multiply in spring and summer and remain dormant throughout the rest of the year (see months with *)

2. Weeds proliferate in spring and summer; workload will increase during this time (see months with *)

3. Pulse monitoring is required at the beginning of each season for mice and rats (see months with *)

4. Wasps are more of a health and safety hazard for people, rather than a biosecurity risk

BIOSECURITY AND PLANT HEALTH TASK PLAN

Regularly scheduled checks across the nursery growing areas will inform the action required over the next day, week(s), and month tracking when it was completed or what requires repeat action will help eliminate and reduce the impact of issues and reduce loss and aid recovery time. Below is an example Task Plan with example entries.

Date	Who	Observation	Action: Now	Action: This week	Action: Next week	Completed? / Ongoing notes
4/6/24	CB	Yellowing on kawakawa		Move to shade		
4/6/24	CB	Wilting on koromiko	Take photo and check roots are not sitting in pooling water / are not dry	Adjust either watering or dip in the hardstand if collecting water	Compare with photo taken to ensure plant health is improving	Photo taken and roots checked - completed
7/9/24	AW	Rust appearing on pōhutukawa	Isolate those plants that are showing symptoms, report on iNaturalist		Re-check all Myrtaceae species for rust and isolate if further diseased plants are found	Isolate plants - completed; Monitoring required - ongoing

ANNUAL SUMMARY: ALL BIOSECURITY OCCURRENCES ACROSS NURSERY

The below is a way to summarise the issues by category for the year. Ideally, we will have a nursery biosecurity community reporting platform where trends across nurseries can be collated and early detection along with community-shared knowledge will prevent wider issues from occurring. Below is an example Annual Summary with example entries.

	Hōtake			Kōanga			Raumati			Ngahuru		
	Pipiri	Hōngoignoi	Here-turi-kōkā	Mahuru	Whiringa-ā-nuku	Whiringi-ā-rangi	Haikhea	Kohitātea	Huitangaru	Poutūte-rangi	Paenga-whāwhā	Haratua
Diseases				Myrtle rust	Myrtle rust	Myrtle rust	Myrtle rust	Myrtle rust	Myrtle rust			
Animals	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids	Psyllids
							Rainbow skinks	Rainbow skinks	Rainbow skinks			
Plants							Moth plant	Moth plant	Moth plant			

METHODOLOGY

PREVENTION THROUGH DESIGN & PRACTICE

Pest control aims to eliminate pests whereas pest management focuses on preventing future infestations. An Integrated Pest Management Plan combines multiple proactive measures to prevent pests, starting with non-chemical methods like improved sanitation and maintenance protocols. The following outlines the key pest management measures for nurseries to undertake.

Placing plants within their optimum growing environment is your main defence to disease. Placement of species should be organised according to what the best growing environment is for each species. This should take into account the amount of airflow required for species.

Equipment and tools should be kept clean, well serviced and sharp to reduce running costs and prevent the spread of disease and damage to plant health. This includes the storage areas in which equipment is kept.

Spent material including cuttings, weeds and old potting mix should not be dumped. Instead, have a designated area for composting treatment and reuse where and as appropriate.

Good practice for all incoming materials and plants should include sterilising with spray eg. fungicide, and visiting your suppliers to discuss their biosecurity practices in regard to potting mix processes and transportation.

Reduce the risk of issues arriving at your nursery by visiting your potting mix suppliers and checking that their potting mix is pest-free. For island-based nurseries a Pest Free Warrant is required for your suppliers, or a biosecurity inspection of supplies will have to be arranged with the Department of Conservation.

Have a dedicated drop off point to ensure external trucks do not drive through your nursery site. This reduces risk of contamination, particularly from vehicles that go to multiple nursery sites e.g. potting mix delivery trucks.

Quarantine areas are designated to receive plants that have come from other sites or for newly identified infestations. Urgent incursion planning is about understanding which disease and pests need to be reported. Ensure your nursery has enough space and bags and/or containers to be able to isolate the infested material away from healthy stock.

Watering should occur in the morning only. If dealing with waterborne diseases such as kauri dieback, irrigation and drainage will affect how the disease may be spread across the nursery hardstand. Ensure your irrigation and drainage system does not exacerbate the spread of disease. You may require water reticulation filters for the purpose of reducing disease spread.

In addition to the above prevention measures, ongoing practices to keep your plants healthy will enable your plants to be able to fight off the attack of common pests. These include:

- Optimal feeding
- Understanding the correct nutrient requirements for the species grown
- Understanding light and water requirements - this may be managed through plant placement
- Wind protection and adequate hardening off at the right stages in growth
- Plant care such as removal of dead plant material without excess pruning away from natural form
- Heading back central leaders in shrub type species to produce a lower density/mass plant



Servicing and cleaning your tools should occur regularly

Health & safety note: Ensure the storage of chemicals is safe and that chemicals are correctly labelled to ensure appropriate use. Correct PPE gear must be worn and there should always be an area to wash it.

MITIGATION

Mitigation may be as simple as adjusting the growing environment by manipulating air movement, light or temperature, through to an aggressive removal of issues such as 'burn and destroy' and 'bag, tag and dump'.

When you have an infestation, isolate the infected plants to the quarantine area and ensure you are wearing gloves and not infecting further plants. Wash clothes, gloves and hands and clean any tools and equipment with water and detergent.

Cultural control includes not growing the same species in the same place each year, changing the irrigation frequency and timing, and hand removal of weeds and pests such as caterpillars.

MONITORING

Early detection of issues reduces the time required for correction and recovery time for plants to return to health. Monitoring could include tohu - signs of well-being that are seen and felt. Record the initial observation of the issue, with annual monitoring to see changes over time. You may want to add in seasonal monitoring. Records should include: dates of monitoring; who undertook the monitoring (for consistency); action required now, this week and next week; a checkbox showing monitoring has been completed and/or is ongoing; and any required notes. Report new signs of previously not seen species e.g. new weeds, rusts, cankers, bugs etc. Below is an example monitoring record with example entries, outlining tohu and corresponding observations over 1, 2 and 3 years.

MONITORING - HEALTH INDICATORS

	Tohu	Observation	1 year	2 years	3 years
Seen	Highly organised	Everything has its place			
Felt	Mauri tau	Felt safe			
Seen	Vibrancy	Lots of people doing diverse things			
Felt	Energised	Harikoa			
Seen	Yellow plants	25% of plants are hungry	5% of plants are hungry	0% of plants are hungry - all plants are well fed	
Felt	Sad	Urgency to act			
Seen	Weeds	High number of germinating weed seeds	50% reduction of weeds	Weeds are only a seasonal issue	
Felt	Overwhelming			Manageable	
Seen					
Felt					

IN-HOUSE AUDITING

This should occur across all biosecurity processes and could be undertaken annually. Audit all of the above while walking the site, records to be kept of all incoming materials as well as all pests and diseases identified.

The audit should include measurable outcomes and recommendations for possible improvements. Audit should be clear and repeatable so that other members of staff can make consistent and comparable records.

PLANT PASS

Plant Pass is a voluntary certification scheme for all New Zealand plant producers that recognises good biosecurity practices and provides assurance for plant buying customers.

Agencies such as Auckland Council have signed up as Plant Buyers Partners. This means Auckland Council and other Plant Buyers Partners will procure from those nurseries that are certified or are working towards obtaining their certification in Plant Pass.

Shown to the right and below are some inspiring nurseries that have achieved their plant pass certification.



Auckland Botanic Gardens Nursery, Manurewa



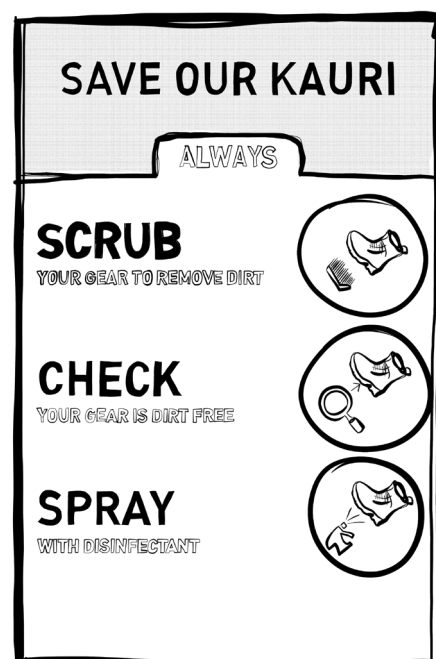
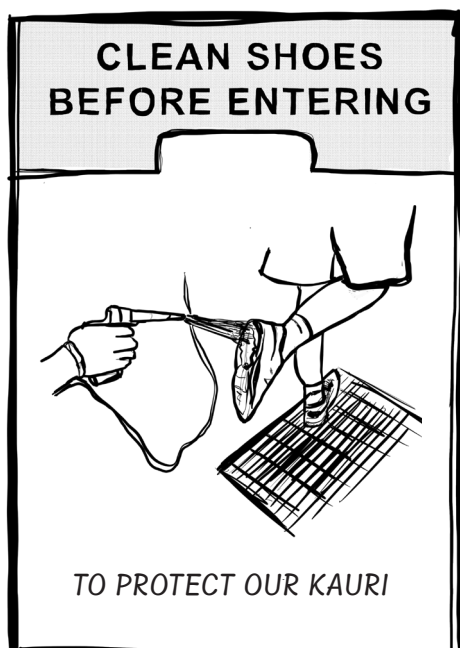
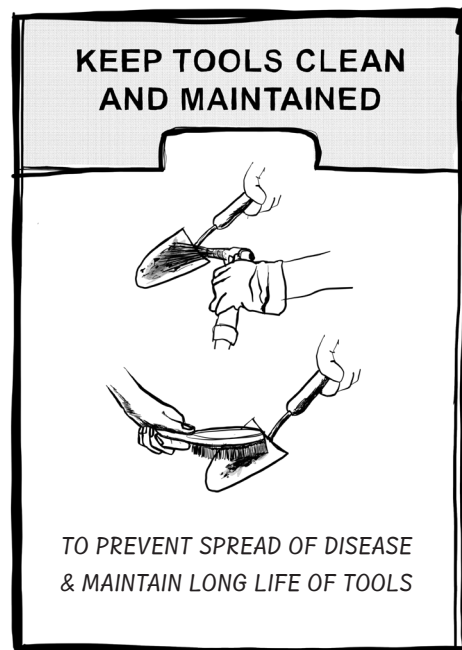
Scrub Growers, Wainui (private commercial nursery)



Rural Design, Kaiwaka (private commercial nursery)

GETTING THE MESSAGE CLEAR & INSPIRING OTHERS

Use clear, visual graphics that provide explanations of biosecurity processes for your staff and/or volunteers. Signage should be inspiring, and motivate people to want to carry out good biosecurity practices and care for biodiversity.



REFERENCES & FURTHER LINKS

- [Te Haumanu Taiao - Te Kaunihera o Tāmaki Makaurau | Auckland Council](#)
- [Plant identification and logging plants - iNaturalist](#)
- [Plant Pass](#)
- [Plant Pass producers](#)
- [Te Aka Kōtuia | Kaitiaki & Community Nurseries in Tāmaki Makaurau](#)
- [Training - Primary ITO, Te Pūkenga](#)
- [New Zealand Plant Producers Incorporated \(NZPPI\)](#)
- [New Zealand Plant Conservation Network | Rōpū hononga Koiora Taiao ki Aotearoa](#)
- [Ministry for Primary Industries | Manatū Ahu Matua](#)
- [Beyond Myrtle Rust - Manaaki Whenua | Landcare Research](#)
- [Plant identification - Manaaki Whenua | Landscape Research](#)
- [Auckland Regional Pest Management Plan 2020-2030 - Te Kaunihera o Tāmaki Makaurau | Auckland Council](#)

IMAGE CREDITS

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- P. 6 *Kauri dieback* - Retrieved from [NZ Geographic](#)
- P. 7 *Myrtle rust* - Retrieved from [Department of Conservation](#)
- P. 7 *Aphids* - Retrieved from [Kings Plant Barn](#)
- P. 7 *Mites* - Retrieved from [Landcare Research](#); Creator: Nicholas A. Martin
- P. 7 *Rainbow skink* - Retrieved from [Department of Conservation](#)
- P. 8 *Slugs & snails* - Retrieved from [Kiwicare](#)
- P. 8 *Liverworts* - Retrieved from [iNaturalist](#)
- P. 8 *Powdery mildew* - Retrieved from [Planta](#)
- P. 8 *Damping off* - Retrieved from [Kiwicare](#)
- P. 9 *Caterpillars* - Retrieved from [Pest Free Kaipātiki Restoration Society](#)
- P. 9 *Windowers & notchers* - Retrieved from [iNaturalist](#); Uploaded by [jon_sullivan](#)
- P. 9 *Psyllids* - Retrieved from [Citizen Science Hub](#); Photo by Phil Bendle
- P. 10 *Black nightshade* - Retrieved from [NZPCN](#); Photographer: Jeremy R. Rolfe
- P. 10 *Climbing dock* - Retrieved from [Weedbusters](#); Taken by Carolyn Lewis
- P. 10 *Chickweed* - Retrieved from [Kiwicare](#)
- P. 11 *Bittercress* - Retrieved from [iNaturalist](#); Uploaded by [nycticorax](#)
- P. 11 *Tree privet* - Retrieved from [Wikispecies](#); Taken by [Fanghong](#)
- P. 11 *Chinese privet* - Retrieved from [Weedbusters](#); Taken by Carolyn Lewis
- P. 11 *Moth plant* - Retrieved from [NZPCN](#); Photographer: Jeremy R. Rolfe
- P. 11 *Woolly nightshade* - Retrieved from [Weedbusters](#); Taken by Trevor James
- P. 20 *Scrub Growers* - Retrieved from [Scrub Growers](#)
- P. 20 *Rural Design* - Retrieved from [Rural Design](#)

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