



GUIDANCE

# Plant Pass Guidance Toolbox

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# Plant Pass Guidance Toolbox

10 June 2021

### Plant Pass Scheme

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## Updates

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The Plant Pass Scheme is a science-based framework to help producers identify, control, manage and avoid biosecurity risk. The Scheme and standards are based on work undertaken early in 2018 following experience early in the myrtle rust response that underscored the crucial role that plant producers play in early detection of pests, their containment and slowing their spread following a pest incursion. Subsequent discussions identified the opportunity to develop a systematic approach to plant production industry biosecurity risk management.

Revisions will be ongoing as the Scheme's experience and/or new science inform the need for change. Revisions published on the Scheme's website [[plantpass.org.nz](http://plantpass.org.nz)] and participants advised of the changes and new documents, so they can ensure that they are referring to the most recent documents.

Those wishing to provide recommendations for change should send these in writing to The Scheme Manager or by email to [office@nzppi.co.nz](mailto:office@nzppi.co.nz).

## Acknowledgements

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Plant Pass acknowledges and is appreciative of the support of many industry members and stakeholders who assisted in the development of the Scheme; funding from the Ministry for Primary Industry, Department of Conservation, Auckland Council and forestry and horticultural industry bodies, the guidance of project Steering and Working Groups, feedback and advice from industry members and stakeholders, and Kiwifruit Vine Health's generously allowing the Scheme to extract from and draw heavily upon their work and the Kiwifruit Plant Certification Scheme.

## Disclaimer

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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.

# Plant Pass Guidance

## 1. Purpose

The Plant Pass Scheme (the Scheme) provides a framework to help nurseries manage the risk their becoming infested or distributing a pest. It protects nurseries, their customers, other primary sectors, the environment and New Zealand's economy from the threat of endemic and exotic pests.

## 2. Introduction

Nursery stock is a well-recognised pathway for the long-distance dispersal of plant pests, both overseas and in New Zealand. This puts the plant production industry, it's supply chains, the environment and New Zealand's primary sector at risk.

This Scheme is a comprehensive nursery biosecurity management system covering a wide array of management activities that relate to pests<sup>1</sup>. It uses a systems approach and a set of actions that are independent of each other, that cumulatively provide a risk mitigation programme.

A certified producer can sell their plants with an assurance to its customers that they have been produced under a system of strong biosecurity risk management. The Scheme cannot guarantee freedom from pests. Plant producers following the programme can provide a high level of assurance that plants are produced in an environment which provides a high level of confidence that plants are practically free<sup>2</sup> of pests when they are sold.

Certified producers implement a systems-based approach to address pest risk management. They shall follow documented risk management systems and build a body of evidence to demonstrate their production has been undertaken under conditions of high biosecurity risk and hazard management. In doing so, they provide assurance that the plants they produce have been raised in conditions that minimise the introduction and inadvertent spread of pests.

Biosecurity risk can be managed in a nursery system by a layering of protection – increasing biosecurity awareness; improving hygiene of nursery premises, production facilities, growing media and other material; diagnostic tools and inspection to establish baseline data and detect new threats, and procedures for movement of material; crop monitoring, surveillance and risk mitigation.

Key steps include:

- ensuring propagation material is pest free
- using only certified production nursery inputs or those where you have a high level of confidence
- good hygiene during propagation, potting, growing, harvesting and dispatch
- hygiene and maintenance of tools, equipment and machinery, limiting the transfer of pests
- crop monitoring and surveillance supported by risk mitigation, corrective actions and strong documentation of plans and actions taken.
- reviewing the system regularly, identify, plan and undertake improvements on a continuous basis.

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<sup>1</sup> Pest - Any species, strain or biotype of plant, animal or pathogenic agent that adversely impacts plants in commercial production or the natural environment

<sup>2</sup> See Definitions – Section 3 of this paper

## 3. Definitions and Abbreviations

### **Appropriate**

An accepted action or outcome deemed fit for purpose by a regulator, standard setting body or industry.

### **Biosecurity**

Measures taken to prevent the introduction and/or to minimize the risk of establishment and spread of a specific pest.

### **Batch**

Plant material from a single source that is treated as one group for the purposes of production in the nursery.

### **Best Practice**

A method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means. It is accepted that best practice will evolve over time as our understanding develops and scientific endeavour informs new approaches.

### **Biosecurity Act 1993**

An Act of Parliament that lists the laws relating to pests and diseases that are capable or potentially capable of causing unwanted harm to any natural and physical resources or human health.

### **Certified producer**

A producer certified under this Scheme, its Core Standard and appropriate Specific Modules.

### **Clean (Cleanse)**

To make free from unwanted material that may harbour pests. In the case of potted plants, removing dead leaves and other unwanted material from the surface of a pot.

### **Consignment**

A quantity of goods that are received or shipped by the plant producer. Used in the context of nursery or production inputs and/or plants that are treated as a single group for handling and/or inspection purposes – example; for inspection of a group of plants and their packaging prior to dispatch.

### **Core Standard**

Part of the Plant Pass Scheme, that outlines hazard management that applicable to all producers.

### **Crop**

Plant material from a single or multiple batch(es) that are treated as single group once planted or potted.

### **Disinfest**

Rid (a being or an object) of infesting vermin<sup>3</sup> by treating or physically removing the target pest species.

### **Guidance**

Advice or information provided to help a producer meet the requirements of the Core Standard or a Specific Module.

### **Growing Area**

Any area in a nursery where plants are established to grow through for one production stage to another.

### **Hitch-hiker pest**

A pest that is carried by plants, plant materials or packaging and does not infest those plants or plant products (Amended ex ISPM#5) and prescribed under some mechanism in the Biosecurity Act 1993 - for example National Pest Plant Accord, Regional Pest Management Plan (within region only).

### **Isolation area**

An area with physical separation from nursery stock for isolation of incoming plants, plant and other materials for inspection and/or for isolating suspected contaminated plants prior to treatment or corrective action.

### **Key measures**

Management processes that the Standard regards crucial to adequately address control biosecurity risk.

### **Module**

see Specific Module

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<sup>3</sup> Vermin = unwanted animals of any sort

**Mother stock plants**

Plants from which propagation material is taken.

**Nursery or Nursery site**

A nursery is any property location where a plant producer undertakes the growing of plants. For clarity, if a plant producer operates on more than one site, any reference to the singular “nursery” in this Scheme, also applies to the plural “nurseries”.

**Nursery Manual**

A document that describes, or collates a body of evidence to show, how they meet the certification to Core Standard.

**Nursery Stock**

Any plant for planting, propagation or ornamentation including greenhouse, containerized, field grown and tissue culture plants.

**Nursery Outputs**

Nursery stock and any associated materials that leave the nursery with that nursery stock. Includes, but is not limited to, packaging and shipping materials (trolleys, crates, cartons pallets etc).

**Nursery block**

A distinct area that is physically separated from another to the extent it can be regarded as a discrete growing area.

**Nursery Manager**

The person responsible for the day-to-day management of the nursery site.

**Pest**

Any species, strain or biotype of plant, animal or pathogenic agent that adversely impacts plants in commercial production, or if spread with nursery stock, adversely impacts the built or natural environments.

**Pest Plant**

As defined in the Biosecurity Act, National Pest Plant Accord (NPPA), or Regional Pest Management Plans (RPMP).

**Plant**

Living plants and parts thereof, including seeds and germplasm.

**Plant Producer / Producer**

A plant producer is defined as any person, business or entity engaged in producing plants or parts of plants for sale, their own use or for movement outside of the nursery, or nurseries where the producer operates over more than one site.

**Plant Pass Scheme / Scheme**

A framework to help plant producers improve biosecurity risk management.

**Plant Production Biosecurity Scheme (PPBS)**

The Scheme name used through the development phases of Plant Pass

**Production site**

A distinct area that is physically separated from another to the extent it can be regarded as a discrete area. (follows nursery block above).

**Property**

Defined in accordance with some government mandated record, definition or system – eg valuation number, Land Information Plan and Lot number.

**Practically Free / Practical Freedom**

A consignment, field, or place of production, without pests in numbers or quantities in excess of those that can be expected to result from, and be consistent with, good cultural and handling practices employed in the production and marketing of the commodity (ISPM 5, 2004).

**Propagative material**

Includes all seeds, cuttings, scion wood, plants and plant material used in the propagation process.

**Risk assessment**

An assessment of both the likelihood and severity of the consequences should hazard occur. This gives a guide as to the overall significance of a risk.

**Sanitise**

Make clean using a chemical to target pathogens. Disinfect using a disinfectant or other phytosanitary treatment; make free from the target pathogen (including virii, phytophthora, fungi and bacteria).

**Scheme**

See Plant Pass Scheme.

**Specific Module**

A hazard management procedure designed to control the spread of a specific pest, a threat to a specific industry, plant species or distribution pathway which is integrated as part of the Scheme.

**Staff**

See Worker.

**Standard**

A set of agreed procedures or practice that provides requirements, specifications, guidelines or characteristics to consistently ensure that materials, products, processes and services are fit for their purpose.

In the context of the Scheme, generic use of the word “standard” refers to the Core Standard or individual Specific Modules or the aggregate of these.

**Sterilise**

Make (something) free from bacteria or other living microorganisms.

**Systems approach**

A set of actions that are independent of each other, that cumulatively provide a risk mitigation program and ensuring confidence in the nursery’s outputs.

**Traceability**

The ability to follow a nursery inputs, plants or a group of plants from one point in the supply chain to another.

**Treat**

An accepted [by industry best practice] procedure for the killing, inactivation or removal of pests [in the broadest sense], or for rendering pests infertile or for devitalization in the case of seeds.

**Trusted Supplier**

Suppliers of nursery inputs who have measures in place to prevent the inadvertent spread of pests from their premises which would lead to the introduction of pests into the nursery of the Producer.

**Wash**

Clean with water and, possibly but not necessarily, soap or detergent. With reference to dirt - remove or be removed by cleaning with water and possibly a detergent.

**Work Area**

Any area in a nursery where plants are manipulated or handled through the production process.

**Worker**

All the people engaged by the plant producer – includes paid employees, workers and volunteers. For clarity, this definition does not include third party contractors; they are regarded as visitors.

## 4.

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## 5. The Plant Pass Scheme

The Scheme is designed to manage the diversity among plant producers, their nurseries, species grown and their markets. This Core Standard focuses on core biosecurity best practice encompassing management and worker responsibly, nursery hygiene, crop monitoring and traceability common across plant production. It includes examples biosecurity hazards and management measures for nursery inputs, through the production cycle and in nursery stock dispatch and transportation.

The **Core Standard** is organised to prompt a producer to identify **biosecurity hazards** that apply to key tasks and production steps in their nursery. They may select from several potential identified hazards for each production step and identify and record others where applicable.

The Core Standard is divided into three parts

- **Part A – Nursery Essentials**  
This section describes the nursery and general operating practices.
- **Part B – Biosecurity Fundamentals**  
This section identifies key components of a biosecurity risk management system
- **Part C – Hazard Management**  
This section identifies specific hazards and measures nurseries shall implement to mitigate the risk that these hazards present. This part is split into three sections:
  1. **All Plant Production** - issues that relate to all plant producers and their nursery(s)
  2. **Container Production** – issues that relate only where production steps include the use of containers (pots, bags, trays ...).
  3. **Bare Root and Field Production** – issues that relate only where production steps include growing plants in the field, that is, part of the production cycle includes plants being grown directly in soil.

This **Guidance** follows the same format as the Core Standard and is provided to assist the producer in identifying key risk management measures and records.

### Scheme Design Principles

The plant production industry is extremely diverse. It comprises a few thousand producers across a wide range of markets, customers and distribution networks, enterprise size, ownership and commercial models and plant species. Producer's awareness of and expertise in biosecurity hazard and risk management varies.

The Scheme's design acknowledges this diversity and can be used by all plant producers, from the smallest to largest nursery, by commercial and community nurseries irrespective of what they grow or who they supply. The **Core Standard** focuses on core biosecurity best practice encompassing management and worker responsibly, nursery hygiene, crop monitoring and traceability. It includes examples of biosecurity hazards and management measures for nursery inputs, through the production cycle and in nursery dispatch and transportation.

Where necessary and desired, **Specific Modules** manage concerns about a specific pest, plant species, industry or distribution pathway that are additional to those in the Core Standard. These may be incorporated as a module within the Scheme, by reference to other biosecurity schemes or through mutual recognition. Examples may include myrtle rust, kauri dieback, kiwifruit nursery stock and plants supplied for restoration of offshore islands.

### Specific Risk Measures

In addition to guidance to meet Core Standard requirements, supplementary guidance is also provided to assist meeting requirements for Specific Modules. These are identified for each section where relevant and include:

- **Myrtle Rust specific measures** – to assist producers who grow myrtaceae meet the requirements of the Myrtle Rust Specific Module.
- **Phytophthora specific measures** – as assist in management risks associated with a broad range of phytophthora species where they are of specific concern to the plant species grown or the plant distribution pathway or end markets.
- **Kauri Dieback specific measures** – to assist producers who grow Kauri meet the requirements of the Kauri Dieback Specific Module.

Part A:

# Nursery Essentials

This section describes the nursery and general operating practices.



## 6. Part A: Nursery Essentials

### 6.1. Nursery Details

Information to identify the producer, the nursery sites they operate and build a picture of the nature of the nursery and their production system shall, where applicable, include:

#### Contact details:

- Nursery name
- Scheme identity reference (if established)
- Physical address
- Mailing address if different from physical address
- Phone
- Email
- Website address (if any)
- The Nursery Manager – the person responsible for the nursery
- Scheme Implementation Manager - the person responsible for implementing this biosecurity Scheme
- Organisation chart identifying other key personnel (if any)

#### Production system

A description of the production system (example containerised, undercover, field grown, combination or other). The description should be enough for the reader to get an understanding of the operational process.

#### Production sites

List all production sites (owned and leased) indicating their size, and location if different to the address above. The size of each production site should be indicated in either total square meters or hectares.

#### Water sources

List all water sources used in the nursery.

#### Nursery maps

For each production site prepare a map locating specific key areas (if they exist) of the nursery such as:

- Mother plants
- Isolation areas
- Areas for incoming plants
- Growing media preparation and/or storage areas
- Potting facilities
- Propagation area
- Production area (greenhouses, outdoor growing areas)
- Dispatch and shipping areas

**Nursery maps** should be in a format to enable quick identification of these areas, and can be an informal sketches, formal plans or notated aerial photographs or in any other form that clearly shows the locations of the above (if they exist) and includes the numbers, letters or names that are used at the nursery to designate blocks, fields, rows or buildings. This information will be used in the inventory system to track plant movement at the nursery.

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#### Myrtle Rust specific measures

- If myrtaceae species are grown, include a bullet point in the Production system paragraph noting this.

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#### Phytophthora specific measures

- If phytophthora risk is of specific concern include a bullet point in the Production System paragraph noting this.

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### Kauri Dieback specific measures

- If Kauri (*Agathis australis*) is grown, include a bullet point in the Production System paragraph noting this.

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### Plant Pass support materials

- Nursery details - Form Template

## 6.2. Management Responsibilities

Nursery management has a key role in planning, implementation and maintenance of Scheme procedures and the documentation. It is also a critical driver in establishing biosecurity awareness and a proactive risk management culture through the nursery and among the entire team.

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### Best Practice

- Management roles noted in the Core Standard can be shared or one person may undertake any or all of them.

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### Record keeping

- Role description for person responsible for the implementing the Core Standard.

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### Plant Pass Scheme support materials

- Role Description Scheme Implementation Manager - Guidance

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### Myrtle Rust specific measures

- Ensure management and staff are aware of any MPI mandated or other regulatory requirements.

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### Kauri Dieback specific measures

- Ensure management and staff are aware of any MPI mandated or other regulatory requirements.

## 6.3. Worker Training

Competent workers are a key component in biosecurity risk and hazard management. They workers are at the front line of biosecurity risk and hazard management. They are well positioned to be the first to notice a pest incursion and their training should include pest awareness and biosecurity best practice informed by support information and documentation so that they understand their roles and responsibilities across the issues and processes that contribute to risk and hazard management.

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### Hazards

- Workers who are not aware of biosecurity best practice can inadvertently spread a pest from one work or growing area, batch or crop to another.
- Untrained workers can miss or misinterpret symptoms of pest contamination.
- Workers can be sources of contamination.

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### Best practice

- Work with workers so they are aware of biosecurity hazards, the role they play in their spread and containment, what to look out for and how to react if they find something that raises concern.
- Establish a formal process to induct new workers in the nursery's biosecurity practices.
- Workplace induction and training includes verbal and written instructions on basic nursery hygiene and biosecurity best practice.

- Written instructions can be supplemented by pictorial training guides or prominent signs.
- Training should be refreshed annually and may be undertaken in-house or through external providers.
- If training records are not available for some workers, record details of their experience.
- Workers should be aware of tracking their own movements within the nursery, hygiene of their own equipment and their roles in enforcing movement control of plant material, growing media, equipment, vehicles, visitors and contractors.
- For permanent workers, competency in task and need for any retraining should be verified at least every 2 years.

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#### Myrtle Rust specific measures

- Provide workers with information on Myrtle Rust and ensure they are aware of the signs and symptoms of myrtle rust and what to do if they find anything suspicious.

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#### Phytophthora specific measures

- Ensure awareness and training processes include *Phytophthora* issues, susceptible host plants, what to look for and how to respond if signs or symptoms are suspected.

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#### Kauri Dieback specific measures

- Measures for Phytophthora above and ...
- Ensure awareness and training processes include kauri dieback issues and what to look for and how to respond if signs or symptoms are suspected.
- Signs and symptoms kauri dieback disease are noted at <https://www.kauridieback.co.nz/recognising-symptoms/>

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#### Record keeping

- Training Record

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#### Plant Pass Scheme support materials

- Staff Induction - Guidance
- Staff Training - Guidance
- Staff Training Record - Form Template
- Toolbox meeting - Guidance
- Toolbox meeting - Form Template

## 6.4. Signage

Biosecurity information and access requirements should be clearly communicated by means of well-designed signage on entering the nursery. Signage should be placed at the main gate, external entrances, visitor parking areas and wash-down facilities. Signs inform visitors that access control and biosecurity is important, and that they share responsibility in maintaining it.

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#### Best Practice

- Signs should highlight the biosecurity risks workers and visitors bring to the nursery and refer to hygiene (and safety requirements) systems in place.
- Adequate signage will ensure that everybody who enters the production site or moves from an area of lower risk measures to one of higher risk (example carpark into production area, carpark to propagation unit), will see appropriate signage at least once.

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## Plant Pass Scheme support materials

- Signage - Guidance

### 6.5. Visitors

People moving between different nurseries and other horticultural enterprises can unknowingly spread pests and mitigation measures should be implemented to reduce this threat. Vehicles can harbour and transfer pests, especially if contaminated with growing media and plant material.

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#### Hazards

- All nursery visitors and their vehicles can be sources of contamination.
- Have visitors clean and sanitise footwear if they enter clean areas.
- Visitors who have recently been on other nurseries, horticultural production sites, or parks and gardens present additional risk.
- Visitors who have recently been overseas may be a source of exotic pest contamination.

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#### Best Practice

- All visitors (contractors, customers etc.) entering the nursery should be made aware that the nursery is operating the Scheme (see Signage).
- Work in advance with contractors on accepted practices. This will help protect the nursery and make the contractor more aware.
- Care should be taken with people who have recently visited other nurseries. Ensure their shoes and clothes (and if applicable, equipment) are clean before entering the nursery.
- All visitor vehicle access to production areas should be restricted to only those places where it is necessary for the visit.
- Prior to entering production areas vehicles should be inspected for possible contaminants. If concerns are raised vehicles should be cleaned and sanitised (especially tyres and truck decks) prior to access to sensitive production areas.
- All visitors moving into or around nursery production areas should sign the visitor's register (apart from visitors that only visit the nursery office, administration building, or owner's house, if it is on the nursery property).
- The register should also detail all movements of contractors on and off site, and the areas of the nursery they accessed.
- Visitors should adhere to access procedures and where possible be accompanied by a worker while on site.
- Scheme documentation/brochures are considered acceptable to raise awareness to new employees or contractors. These can be tailored to the site.
- Great care should be taken with people who have recently been overseas, or overseas visitors, to ensure that shoes and clothes are clean before entering the operation.
- If the nursery site is open to the public, consider isolating sensitive areas (eg propagation houses) and more frequent crop monitoring may be required.
- If visitors handle plants or undertake nursery production activities, treat them as workers.

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#### Myrtle Rust specific measures

- Ensure visitor awareness information includes the risks associated with their interdicting myrtle rust into the nursery. Check that have not recently knowingly come from myrtle rust infected areas or handled infected plants.

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**Kauri Dieback specific measures**

- Establish cleaning and sanitation procedures for visitor and their vehicles, equipment and materials who may have visit kauri forests recently.

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**Record Keeping**

- Visitor Register

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**Plant Pass Scheme support materials**

- Visitors - Guidance
- Visitor record – form template

Part B:

# Biosecurity Management Fundamentals

This section identifies specific hazards and measures nurseries must implement to mitigate the risk that these hazards present

## 7. Part B: Biosecurity Management Fundamentals

### 7.1. A Systems Approach

A systems approach is a set of actions that are independent of each other, that cumulatively provide a risk mitigation program and ensuring confidence in the nursery's outputs.

The Scheme is aligned with **HACCP methodology** (Hazard Analysis and Critical Control Points) to help identify and manage risk within the nursery production process. HACCP is a systematic and preventative approach to managing risk that is widely used in many industries, it scales with risk and enterprise complexity and has been adopted as the standard risk management tool for food safety.

Key HACCP principles are to identify all potential hazards in a production system and identify intervention points where these hazards can be controlled, prevented or reduced. This has been adapted to provide a framework for the Scheme.

This Core Standard at its Checklist provide a framework to implement and monitor a systematic approach to plant production biosecurity best practice.

A systems approach to **biosecurity best practice** is fostered through:

- Management commitment to biosecurity best practice and building a workplace culture where this is instilled throughout the nursery and among its worker.
- Measures to prevent the nursery becoming infested with a pest from contaminated production inputs.
- A high standard of nursery production hygiene to prevent pests spreading through the nursery.
- Comprehensive inspection and monitoring programmes and corrective action procedures during the growing cycle.
- Measures to prevent the nursery spreading pests through plant distribution and transportation.

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#### A Nursery Manual or a Body of Evidence

- A key component in a systems approach is a set of clearly defined and repeatable steps to ensure a consistent approach to risk management. These are most often recorded in an operations manual ... in this case a "Nursery Manual". Plant Producers may find this the most appropriate way to ensure comprehensive risk management. It provides a single point of reference, it's readily updated and referenced by management, workers and Scheme auditors.
- For some however, procedures are dispersed through other documents and nursery production systems. This too is entirely acceptable if they are readily accessed during an Plant Pass Scheme audit.
- Risk management procedures can take many forms - written instructions, formal documents, a daily checklist, a chart of the wall, signage, posters ... anything that lets people know what they need to do in a consistent and reliable fashion.
- Plant producers are also encouraged to develop job hazard analyses and protocols that outline biosecurity hygiene measures.

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#### Continuous Improvement - Review, Plan, Do

- Another component of a systems approach is regular review of the procedures and their outcomes to ensure ongoing fitness or purpose. Records are an essential part of this process; they enable review, identification of trends, variances and corrective actions.
- Records too can take many forms – spreadsheets, notebooks, diary records, propagation and production lists, inwards or outwards shipping documents ... anything that can be reviewed later that records the outcome of a process or demonstrates that something has been done.
- Producers can store these in their Nursery Manual and/or have them dispersed (but readily available) through other record locations – example staff training records in personnel files.
- Records through the production process and period, the annual self-assessment against the checklist and an annual risk assessment will identify areas for improvement and a resulting implementation plan

for action though the following period. Once complete, the cycle begins again, and the system is improved progressively over time.

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### Myrtle Rust specific measures

- Signup to NZPPI's Biosecurity Register for updates.

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### Record Keeping

- Scheme self-assessments and outcomes

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### Plant Pass Scheme support materials

- Getting Started - Guidance
- PBSS Resources - Guidance
- Self-Assessment and Corrective Action record - form template

## 7.2. Hygiene

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### Hazards

- Plant materials, people, equipment and vehicles are all potential sources of pests being introduced or spread around the nursery.

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### Best Practice

#### Nursery Site

- Construct nursery facilities to prevent the ingress of runoff water.
- Introduce systems to manage waste plant material and other risk material.
- In container production areas, prevent pots, plants, tools and irrigation hoses being exposed to contaminated soil by metalling or paving all walkways and surfaces and suppressing dust.
- Assess boundary risk (runoff, mud, wind-borne material, splash from roads, paths), install barriers where practicable and introduce other measures if needed.
- Remove all weeds, pest host plants of high concern and pest plants within the nursery site, including where practicable along boundary fences to avoid weed seed contamination and alternate pest host sources.
- If weed seeds from neighbouring properties pose a problem, work with neighbours to try to eliminate the hazard. If this is not practicable, monitor impacted areas more frequently.

#### Nursery Access

- Access to production and propagation areas should be restricted to those people directly involved in the production process. Access to production areas by visitors and other workers should be discouraged and managed appropriately.
- Signage identifying biosecurity risks and restricted areas should be displayed at all entrances to production areas. Signs should include contact details of the Nursery Manager for visitors to request access.
- Where practical, access should be limited to one point of entry to reduce the presence of unauthorised personal.
- Only essential vehicles, machinery and equipment should be allowed in the production areas. Other non-essential equipment should be routed around or outside production areas.
- The Nursery Manager should ensure visiting contractors and other personnel are aware of the potential biosecurity risks in production areas, and only enter these areas when necessary.



- Have visitors clean and sanitise footwear if they enter clean areas of nursery.
- Workers and/or visitors who have recently been at other nurseries, horticultural production sites parks and gardens, or overseas present additional risk. Check their clothing and vehicles for possible contamination particularly weed seeds.

#### Nursery personnel

- All workers involved in nursery production have a responsibility for maintaining a high standard of biosecurity practice.
- This includes:
  - Managing their own personal biosecurity before and between batches, and on arrival at and prior to leaving work – example washing hands with soap and water.
  - Ensuring footwear and clothing is clean especially when arriving at work and before going home and coming from possible areas of infection such as collecting plant material offsite.
  - Workers returning from the field or other nursery sites should sanitise footwear and change their outer layer of clothing before re-entering sensitive areas.
  - Footbaths should be provided for people to clean and disinfect footwear prior to entering propagation areas or other sensitive growing areas (example, greenhouses).
  - Where worn, preferentially use and sanitise waterproof disposable gloves, if leather/fabric gloves are used, keep clean, wash frequently and avoid gloves from home unless they are freshly laundered.
  - Sanitising hands and gloves in contact with ground before handling plants.
  - Workers should be trained in and fully aware of all biosecurity hygiene requirements before working with plant material.
- Provide workers with sanitising supplies, kits and workstations.

#### Equipment cleaning

- Develop a systematic approach to cleaning and sanitising tools, equipment and vehicles based upon risk: example:
  - Clean everything.
  - Wash all equipment and tools
  - Wash all vehicles that enter the production site
  - Sanitise anything exposed to plant roots.
  - Sanitise work surfaces that come into contact with plant wounds.
  - Sanitise cutting and pruning tools.
 ... this is expanded on below.
- Any sanitation step must be preceded by a cleaning step to remove soil, plant debris and other organic materials as these often lessen disinfectant efficacy.
- Vehicles, equipment and tools are a common vector of biosecurity threats. Vehicles and tools dedicated to a particular site or task that can be easily cleaned and sanitised will reduce the risk of spreading pests between sites.
- Cutting and pruning tools and equipment used for propagation and plant maintenance should be cleaned and sanitised between batches and blocks, at regular intervals when working on a large batch of plants and at the end of any day in which they are used.
- Tools and equipment used to collect propagation material should be cleaned and sanitised prior to collection, between sites and species, and at the end of the collection process.
- Tools and equipment that are exposed to plant roots should be cleaned and sanitised between batches, at regular intervals when working on a large batch of plants, and at the end of any day in which they are used.
- All other tools and equipment should be cleaned at regular intervals – example after use and/or at the end of the days when they are used.
- If practicable, vehicles and wheeled equipment should remain on concrete or metalled pathways

avoiding contact with soil.

- Where vehicles and/or equipment are directly exposed to soil they should be cleaned and washed down before entering and between growing areas.
- Equipment and machinery sourced from off-site (including new, second-hand or contractor's) should be isolated on arrival, inspected and if necessary, cleaned and disinfested before moving them into the nursery.
- Where practical undertaking washing and cleaning away from growing and production areas, and always direct used washing and cleaning water away from growing and production areas.

#### **Plant and waste materials**

- Trimmings and prunings may present a biosecurity risk and should be removed from container plant production areas daily and not left lying around on site as a potential source of infection. They can be disposed of via in bulk waste, deep burial or, if not diseased, composting or greenwaste.
- Waste storage areas should be isolated, preferably downhill, downwind and away from water courses.
- Use covered bins in preference to open waste piles.
- Diseased plants should be disposed of through bulk waste or deep burial, and preferably bagged before disposal.
- Unsaleable or rejected non-diseased plants should be removed from growing areas as soon as practicable. Dispose of through bulk waste, deep burial or, if not diseased, composting or greenwaste.
- Spilt growing media also presents a biosecurity risk and should be swept and disposed.
- If used potting mix is recycled measures need to be put into place to manage contamination risk.

#### **Work and growing areas**

- Propagation work surfaces should be constructed from or covered with non-porous materials. Plant and other waste material should be removed, and the work surface cleaned and sanitised between batches and at the end of any day when they are in use.
- Work surfaces in other production areas that are exposed to plant wounds and roots should have plant and waste material removed and cleaned and sanitised between batches and at the end of any day when they are in use.
- All other work surfaces should have plant and waste material removed between batches and cleaned at the end of any day when they are in use.
- All other work areas should be kept tidy.
- Benches should be wire mesh or non-porous open materials to allow water movement and effective cleaning and sanitation.
- Avoid having bare ground under benches, use concrete, deep gravel aggregate or similar. Keep clean and free of weeds, standing water and plant debris.
- Growing areas should be cleaned and appropriately prepared prior to placing a new container grown batch or planting a new field batch.
- Container production growing areas should have plant and waste material removed between batches and beds or benches cleaned and sanitised before a new crop is put down.
- Capillary beds should enable a flow of water through/over them and be cleared at least annually and cleaned and sanitised to mitigate the risk of long-term pathogen build-up.
- Use permeable membrane over capillary beds to facilitate cleaning.
- Greenhouses should be kept clean and free of algal buildup on floors, under benches and walls.
- Avoid unnecessary handling of plants, it increases risk of worker to plant pest transfer.

#### **Multiple Sites**

- Nurseries with multiple sites should consider ways of reducing the transfer of all but essential items (including plants and equipment) between sites.
- Unnecessary worker movement between sites should be prevented.

- Undertake a risk analysis of vehicles and equipment that are transferred between sites and implement measures as appropriate.
- Consider dedicated tools and equipment on each site.

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#### **Myrtle Rust specific measures**

- Contaminated clothing is a considerable risk. Ensure staff and visitors are aware of this and inspect clothing and footwear if they have recently visited risk areas or handled infected plants.
- Contaminated vehicles, equipment and machinery are a considerable risk. Increase inspection vigilance and consider sanitation as a routine for items that transferred from outside the nursery into work and growing areas.
- Nursery waste, including sweepings from trucks, can harbour spores. Increase waste management vigilance.
- Wind borne spore spread is a major risk factor. Where practicable, remove myrtle rust host species been removed from boundary and nearby plantings? If this is not possible, increase monitoring near boundaries and downwind of potential contamination sources.

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#### **Phytophthora specific measures**

- Regularly clean and sanitise all working areas and equipment linked to potting and preparation of potting media.

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#### **Kauri Dieback specific measures**

- Measures for Phytophthora above and ...
- Establish cleaning and sanitation procedures for workers, vehicles, equipment and materials before leaving the nursery to visit kauri forests and before returning from forests to the nursery.
- Use dedicated clothing (eg overalls) and footwear for forest work; change before re-entering the nursery.

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#### **Record keeping**

- Checklists provide both a record and a reminder to sound nursery hygiene practices.
  - Daily propagation and production hygiene checklist (and supervisor signoff)
  - Production records

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#### **Plant Pass Scheme support materials**

- Sanitation procedures – guidance
- Hygiene procedure checklist - form template

## **7.3. Crop Monitoring**

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#### **Hazards**

- Pest populations develop and spread without nursery management being aware of them.

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#### **Best Practice**

- Establish a formal monitoring plan with areas of the nursery inspected on a regular basis.
- The plan should identify the frequency of monitoring, how monitoring is conducted on what to look for.
- Monitoring records should include the date, the areas of the nursery that were inspected, who undertook the inspection and the outcome including details of pests that were detected (if any) and

corrective action applied (if any).

- Frequency will depend on the season, plant species grown and pests of concern. Monitoring at least on a monthly basis is recommended. Check more regularly if conditions warrant it.
- Formal monitoring should be undertaken by trained people and follow a routine procedure walking the perimeter of a batch, crop or growing area and several transects through the block and its rows of plants.
- Make a list of pests of concern to your crops – descriptions, symptoms, photos and posters help workers become familiar with what to look out for.
- In preparing the above pest list consider pest plants subject to the National Pest Plant Accord and Regional Pest Management Plan(s) relevant to your nursery site and regions that you ship plants to. The latter also includes animal and insect pests that could prove harmful if shipped with nursery stock or packaging.
- Encourage all workers to keep an eye out for and report any occurrence of pest symptoms whether they are of known threats or not. As workers handle plants on a frequent basis through the growing cycle and at dispatch, they are in a strong position to report any pest symptoms.
- Use the nursery map to divide the nursery into areas where pest threats and risks are likely to be similar.
- All plants and mother stock plants (if on the nursery site) should be monitored at intervals determined by the growing cycle of the given plant and its pest species.
- Mother stock plants not on the nursery site should be monitored inspected immediately prior to any propagation material being taken and where possible monitored through-out the year.
- Undertake corrective action if pests are detected, isolating plants where possible.
- Unhealthy or diseased plants should be disposed of through bulk waste or deep burial, and preferably bagged before disposal. Do not compost or send to greenwaste.
- If pests are detected but cannot be identified or if signs and/or symptoms are present and are unaccounted for, take samples and send for diagnostic analysis for identification and then undertake appropriate corrective action.
- Have a system in place to respond to biosecurity issues raised by staff, customers and/or others and records of subsequent investigation and corrective actions.
- In preparing your list of pests of concern to your crops consider pest plants subject to the National Pest Plant Accord (NPPA) and Regional Pest Management Plans (RPMP) relevant for your nursery's location and the regions that you ship plants to. RPMPs also includes animal and insect pests that could prove harmful if shipped with nursery stock or packaging. Additionally, when adding a plant species to your range, check these lists to ensure it is not subject to one of the relevant lists.
  - The NPPA Plant list can be found here - <https://www.mpi.govt.nz/dmsdocument/3664-national-pest-plant-accord-manual-reprinted-in-february-2020-minor-amendments-only>
  - A list of RPMPs can be found here - <https://www.bionet.nz/rules/pest-management-plans/>
- Maintain records of pest detections noting details that help inform future monitoring – headings include, the pest, host plants, pest density, date reported, location in the nursery, prevailing winds, weather etc. Photos and posters will help worker awareness.

#### **Myrtle Rust specific measures**

- Undertake surveys of all myrtaceous species on-site in a 14-day cycle during myrtle rust risk periods (late spring to late autumn) and at monthly at other times of the year - this includes production stock and plants along boundaries and roadways.
- Prepare myrtle rust corrective action and response procedures to be ready of myrtle rust signs or symptoms detected and threaten the nursery.

#### **Phytophthora specific measures**

- Remove suspect plants to isolation area immediately, identify original location and monitor nearby plants for symptoms.

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#### Kauri Dieback specific measures

- Measures for *Phytophthora* above and ...
- Signs or symptoms of *Phytophthora agathidicida* infection include unhealthy kauri plants where there is any rapid unexplained decline or death. Contain the plant batch and do not sell or distribute plants from the batch.
- Contact the **Kauri Dieback Programme** – [kauridieback@mpi.govt.nz](mailto:kauridieback@mpi.govt.nz).
- They will advise diagnostic testing or disposed of as waste material:
  - If diagnostic testing is required, the Kauri Dieback Programme will provide instructions. Continue to contain the batch unless advised otherwise.
  - If disposal is advised, plant and other waste should be double bagged and sent to an approved landfill. Do not compost or send to green waste. Appropriate procedures and approved landfills are recorded here <https://www.kauridieback.co.nz/media/2024/best-practise-guideline-landfill-disposal-of-contaminate-material-031218v3.pdf>  
If there is no landfill near you, seek direction from the Kauri Dieback Programme.

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#### Record keeping

- Crop monitoring records inclusive of
  - Monitoring records to inform future monitoring.
  - Any pests identified and corrective action.
  - Samples that have been sent for diagnostics, the results and subsequent corrective action.

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#### Plant Pass Scheme support materials

- Crop monitoring – guidance
- Crop monitoring record - form template
- Pest identification and diagnostics – guidance

## 7.4. Traceability

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#### Best Practice

- Good traceability records will enable quick access in the case of a pest incursion either in the nursery, at one of the nurseries suppliers and/or at one of their customers.
- To facilitate this, plants should be batched to at least species level from the start of the production process (and to cultivar level where applicable). This allows a biosecurity issue to be traced back to source and forward to identify what and where else the issue might impact.
- Start “batching” at seed, cutting or other material collection steps, and upon the receipt of plant material from another nursery.
- Each production batch should be identifiable through each production step.
- Keep batches of plants together. For example, if you are propagating a single cultivar or seed line over a several days, treat each harvest of cuttings (or at the very least, each day’s work) as an individual batch. When the potted, treat them separate batches. When the plants are harvested keep records of each batch.

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#### Kauri Dieback specific measures

- Adopt a strict batching process for kauri crops – treat plants from each seed sowing and/or potting activity as a separate batch.

- Split larger batches into smaller sub-batches to limit risk of inadvertent contamination spreading more widely.

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#### Record keeping

- Nursery records should facilitate rapid recovery of data to show
  - The source of all nursery inputs.
  - Where propagative or young plant material came from for any given batch.
  - How that batch progressed through the nursery production system.
  - Who and/or where plants from that batch were sold/shipped to.

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#### Plant Pass Scheme support materials

- Traceability procedures - guidance

## 7.5. Trusted Suppliers and Inwards Supplies

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#### Hazards

- Anything that is sourced off site may present biosecurity risk. The material, its packaging or transport may be contaminated. A nursery is placing considerable trust in the supplier and should have some system in place to validate that trust.

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#### Best Practice

- Wherever possible, plant materials and other biological materials (example, growing media) should only be sourced from Scheme certified producers.
- In the absence of certified producers, source nursery materials only from **trusted suppliers**. These are suppliers who can demonstrate they have measures in place to prevent the spread of pests. This will be in the form of a commitment to biosecurity quality assurance of a similar nature to this Standard, that is, they manage biosecurity risk through a system of measures, inspections and corrective action, so that a producer can have confidence that suppliers are not introducing pests into the nursery. Methods to build confidence include:
  - Trading relationships and history
  - Site visits and inspections
  - Recommendations from other producers
  - Trial purchases in smaller volumes
  - Increased inspection and/or monitoring vigilance at early stages of supply
- Inspection of inwards supplies is an important part of keeping pests out of a nursery. The risks associated with plant materials and growing media are addressed below.
- A major issue with other nursery production supplies is hitch-hiker pests in packaging, on pallets and vehicles – weed seeds, ants and unwanted insects for example. Delivery vehicles that have come from other nursery site also pose a risk. Movement of goods and supplies is a major pathway for the spread of Brown Marmorated Stink Bug (BMSB) for example.
- Storage can also be an issue – store materials where they are appropriately protected and least likely to provide a habitat for pests.
- Inwards supplies inspections can be recorded in a standalone form (we've a BBPS template), through notating the packing slip or invoice with inspection date and signature, or some other means that will facilitate recovery later.

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#### Record keeping

- Trusted supplier register

- Inspection records.

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**Plant Pass Scheme support materials**

- Trusted supplier list - form template
- Inwards goods inspection - form template

# Part C:

## Hazard Management

This section identifies specific hazards and measures nurseries must implement to mitigate risk that arise through the production process

It is split into three sections:

- **Section C1 – #8: All Plant Production** – issues that relate to all plant producers and their nursery(s)
- **Section C2 – #9: Container Production** – issues that relate only where production steps include the use of containers (pots, bags, trays ...).
- **Section C3 – #10: Bare Root and Field Production** – issues that relate only where production steps include growing plants in the field, that is, part of the production cycle includes plants being grown directly in soil.



## 8. Part C1: Hazard Management – All Plant Production

These issues in this section relate to all plant producers and their nursery(s) irrespective of the methods they use to grow their plants.

This section is supplemented by:

- **Part C2 – #9: Container Production** – where production steps include the use of containers (pots, bags, trays ...).
- **Part C3 - #10: Bare Root and Field Production** – where production steps include growing plants in the field; that is, part of the production cycle includes plants being grown directly in soil.

### 8.1. Transplant

#### 8.1.1. Plant Stock for propagation &/or planting

Plant stock and propagation materials are high risk pathways from introducing pests to the nursery - ensure that propagation stock and incoming plant material, including seed and the environment where materials are sourced or collected are clean and free of pests.

#### HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Source young plants from offsite.		Plants, transport, containers and/or packaging are contaminated with pests.	<p>Source plants only from trusted suppliers.</p> <p>Seek records of prior treatments; some prior treatments can simply suppress pest symptoms.</p> <p>Inspect and/or test plants sourced offsite upon receipt.</p> <p>Isolate imported material until inspections are complete.</p> <p>Nominate an isolation period and treatments.</p> <p>Consider preventative application of crop protection product.</p>	<p>Identify pest signs and/or symptoms and treat appropriately.</p> <p>Undertake diagnostic testing where symptoms are unable to be identified and treat appropriately.</p> <p>Reject, or isolate and treat contaminated plant material or packaging.</p>
Source propagation material from mother stock plants from on- or offsite.		Introduction of nursery-sourced pests into the field. Mother stock plants, propagation material and/or transport / packaging are contaminated with pests.	<p>Clean clothing, gear and vehicles before leaving the nursery, between sites and before returning to nursery.</p> <p>Source propagation material only from healthy plants and locations free of pests.</p> <p>Record location of source material to the extent that you could relocate later if</p>	<p>Identify pest signs and/or symptoms and treat appropriately.</p> <p>Undertake diagnostic testing where symptoms are unable to be identified and treat appropriately.</p> <p>Treat or remove infested mother stock</p> <p>Reject, or isolate and treat contaminated plant</p>

			<p>need be.</p> <p>Maintain mother plants in a high state of health and if possible, position growing areas away from potential pest reservoirs.</p> <p>Inspect mother stock plants where practicable on a regular basis and always immediately prior to harvesting propagation material.</p> <p>Avoid collecting material from parts of the plant that may be contaminated by water splash from the surrounding ground.</p> <p>Keep packaging and transport materials free of pests, soil and non-target plant material.</p> <p>Use new, or clean and sanitise bags and containers.</p> <p>Avoid collecting seed from the ground - If fallen seed is essential, knock onto clean tarps placed on the ground or collect using seed traps</p> <p>Isolate collected fallen seed and sterilise/treat or before use.</p> <p>Sanitise gloves, hands, tools if in contact with soil.</p> <p>Undertake seed cleaning in an isolation area before taking seed into clean nursery areas.</p>	material or packaging
Plant stock rejected and/or returned from customers or the field.		Contaminated with pests.	<p>Do not accept it. Have it disposed of rather than returned.</p> <p>If above is not practical, isolate upon return, inspect before accepting into the nursery. Ideally hold in an isolation area until you are confident it is free of pests.</p>	Identify pest signs and/or symptoms and treat appropriately.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Myrtle Rust specific measures

- Contaminated propagation material is a high risk.
  - Rigorously inspect stock, other source plants and surrounding areas for the presence of myrtle

rust before taking cuttings or collecting seed.

- Isolate all myrtaceous plant stock sourced from off-site upon arrival and inspect it before transferring it into the nursery production area.
- Adopt stringent staff, vehicles, equipment, tool and packaging hygiene measures before leaving the nursery to collect material from the field and upon return.
- Insist upon a Myrtle Rust Biosecurity Declaration from the supplier for any myrtaceous plant stock sourced from another nursery.

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### Phytophthora specific measures

#### Bought in plants

- Bought-in plants are a major risk pathway for *Phytophthora* species between nurseries.
  - Avoid using bought-in plants where possible.
  - If bought-in plants are needed:
    - Source micro-propagated plants preferentially.
    - Accept plant material (including soil and/or potting mix) sourced only from reputable suppliers who can demonstrate they have systems in place to avoid contamination of the material they supply.
- Do not treat plant material with fungicides on arrival, so if the material has asymptomatic infection, it allows time for the pathogen to grow and the disease symptoms to be observed.
- Isolate bought-in plants from other stock for as long as practicable. This too allows time for the pathogen to grow and the disease symptoms to be observed before other stock is placed at risk of infection.

#### Processing field collected seed and propagules

- Where compatible with seed, treat to eliminate potential pathogens.
- Segregate soil-sourced propagules from seed/cuttings.

#### Stock plants

- Grow stock plants in containers in clean areas with generous spacing.
- Consider pathogen testing mother stock plants prior to the “propagation” season.
- Irrigate stock plants by trickle.
- Do not treat stock plants with fungicides

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### Kauri Dieback specific measures

- Measures for Phytophthora above and ...
- Collect seed in kauri dieback free areas and only from healthy trees with good foliage cover and no signs of yellowing leaves or any trunk lesions in the lower trunk area.
- Cones containing seeds should be collected from at least 1m above the ground to be sure they have not had contact with contaminated soil or leaf litter.

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#### Record keeping

- Trusted supplier register.
- Materials inspection and corrective action record.
- Production records.

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#### Plant Pass Scheme support materials

- Propagule Collection - guidance

- Plant source record - form template

### 8.1.2. Growing Media

Growing media or its component materials have the potential to introduce pests to the nursery. Producers should obtain growing media or its component materials from trusted suppliers that have measures in place to prevent the introduction and spread of pests.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Source growing media or component materials.		Media, component materials, packaging and/or transport contaminated with pests.	Source media and materials from trusted suppliers. Seek manufacturer testing records. Inspect materials for visible pests (insects, hitch-hiker pests and weeds) upon receipt. If component materials are sources from the “wild” undertake a risk assessment to identify the risk of a pest (unwanted insect, pathogen or hitch hiker) being introduced into the nursery.	Where possible, reject contaminated materials before they are unloaded. Treat or dispose of contaminated materials already on-site.
Prepare growing media.		Contamination during mixing: <ul style="list-style-type: none"> <li>• Mixing equipment.</li> <li>• Mixing surfaces.</li> </ul>	Clean equipment on a regular basis. Keep mixing surfaces free of pests, plant material and standing water.	
Store growing media or component materials.		Contamination during storage.	Construct soilless growing media storage areas with a concrete floor to prevent ingress of soil borne pathogens. Construct storage areas to prevent from ingress of runoff water (raised), plant material and other risk material. Clean storage areas between batches. Keep storage areas free from pests. Cover storage areas and/or piles.	Treat or dispose of contaminated media or components.
Soilless growing media or component materials are		Pathogens and/or weed seeds are carried over from prior crops into new	Media and/or component materials are sterilised prior to reuse.	

recycled.		production.		
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APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- Regularly clean and sanitise all working areas and equipment linked to preparation and storage of potting media.
- Consider pasteurisation before use with high risk crops in sensitive production areas – example, propagation.
- Avoid using recycled soilless growing media or component materials.

#### Kauri Dieback specific measures

- Measures for Phytophthora above and ...
- Do not reuse potting mix.
- If bulk bins are used, clean and sanitise between mixes.

#### Record keeping

- Trusted supplier register
- Materials inspection and corrective action record
- Production records

#### Plant Pass Scheme support materials

- Growing Media Receipt and Inspection Record - form template

### 8.1.3. Fertiliser

Manufactured fertilisers are unlikely to present a biosecurity threat other than through hitch hiker pests being introduced inadvertently on packaging. Record supplier information and inspect materials and packaging on arrival.

Undertake a risk analysis if organic fertilisers are used. They may contain pests and additional measures may be required to manage this risk.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Source fertiliser		Fertiliser, packaging and/or transport contaminated with pests.	Source fertiliser from trusted suppliers. Use reliable transporters who regularly clean their vehicles. Inspect materials upon receipt.	Where possible, reject contaminated materials before they are unloaded. Treat or dispose of contaminated materials already on-site
Source organic manures		Manure, packaging and/or transport contaminated with	Undertake a risk analysis. Source materials from trusted	Where possible, reject contaminated materials before they are unloaded.

		pests.	suppliers. Where practicable, inspect materials upon receipt. If this is not practicable, for example bulk deliveries to field operations, build strong measures into your supplier trust measures and their pest management.	Treat or dispose of contaminated materials already on-site.
Store fertiliser or manures		Contamination during storage.	Construct storage areas to prevent from ingress of runoff water, plant material and other risk material.  Keep storage areas free from pests.	Treat or dispose of contaminated organic fertiliser and manures.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Trusted supplier register
- Materials inspection and corrective action record

#### Plant Pass Scheme support materials

- Inwards goods inspection - form template

### 8.1.4. Containers (pots, bags, trays ...)

New containers and their packaging have the potential to introduce pests into the nursery, with the most likely hazard being hitchhiker pests on packaging or in transport. Producers should obtain containers from trusted suppliers and use reliable transporters who maintain clean vehicles.

If containers are recycled, measures need to be in place to ensure pests are not carried forward to new crops.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Source containers.		Containers, packaging and/or transport contaminated with pests.	Ideally use only new containers. Source containers from trusted suppliers. Use reliable transporters who regularly clean their vehicles. Inspect materials upon receipt.	Where possible, reject contaminated materials before they are unloaded.  Treat or dispose of contaminated materials already on-site.
Store containers.		Contamination during storage.	Construct storage areas to prevent from ingress of runoff water.  Store off the ground.  Maintain storage area free of	Treat contaminated containers.

			weeds, accumulations of plant and other risk materials. Keep storage areas free from pests. Inspect for contamination prior to use.	
Reuse containers.		Contamination from prior crops or storage prior to reuse.	Treat any used container as if it was contaminated. Clean first and then sanitise prior to reuse. Segregate new and recycled in storage. Inspect for contamination prior to use.	Treat contaminated containers.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Kauri Dieback specific measures

- If possible, only use new containers, and store these to avoid contamination.
- If containers are reused, thorough cleaning and sanitation is essential.

#### Record keeping

- Materials inspection and corrective action record
- Recycled container treatment records

#### Plant Pass Scheme support materials

- Sanitation Procedures - guidance
- Inwards goods inspection - form template

### 8.1.5. Propagation

In propagation, plants are at one of their most vulnerable stages to contamination from pathogens and infestation by insects. Hazards include air borne and water transmitted pests, tools, machinery and work surfaces, and contamination from worker who work or visit the propagation unit. Good quality propagation material, appropriate management, excellent hygiene and good record keeping are essential for successful propagation.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Prepare propagules		Contaminated incoming propagules Contamination from cutting tools. Contamination from workers, propagation	Inspect materials upon receipt. Clean and sanitise cutting tools between batches and at the start and end of each day in which they are used.	Where possible, reject contaminated materials before they are taken unloaded. Isolate and treat contaminated materials.

		environment	Maintain facility and worker hygiene measures. Restrict entry to propagation areas. Clean-up waste – media, soil and green waste.	Sanitise contaminated environment & tools.
Plant propagules		Contamination of incoming stock. Contamination from workers, environment & tools. Containers are contaminated with pests.	Maintain facility and worker hygiene measures. Clean-up waste – media, soil and green waste. Inspect containers before use.	Sanitise contaminated environment, tools and containers.
Grow propagules		Contamination from workers, environment & tools.	Maintain hygiene measures in the growing areas. Monitor growing areas on a regular basis.	Identify pest, its signs and/or symptoms and treat appropriately. Undertake diagnostic testing where signs and/or symptoms are unable to be identified and treat appropriately. Reject, or isolate and treat contaminated plant material. Sanitise contaminated growing areas.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Materials inspection and corrective action record
- Facility hygiene checklists
- Propagation production records
- Monitoring and corrective action record

#### 8.1.6. Potting and re-potting

When plants are being potted (and until they are established) they are susceptible to competition from weeds, attack from pathogens and infestation by insects. Hazards include air borne and water transmitted pests, tools, machinery and work surfaces, and contamination from workers who work in or visit the potting facility.

Sound nursery hygiene practices are critical to growing and protecting young plant stock.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
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Prepare plant stock		Contaminated incoming plant stock. Contamination from workers, potting environment, machinery & tools.	Inspect materials upon receipt. Maintain facility and worker hygiene. Clean-up waste – media, soil and green waste.	Where possible, reject contaminated materials before they are taken unloaded. Isolate and treat contaminated materials. Sanitise contaminated environment & tools.
Potting		Contamination from workers, environment & tools. Containers are contaminated with pests.	Maintain facility and worker hygiene measures. Regularly clean and disinfest potting environment, machinery and tools. Clean-up waste – media, soil and green waste. Inspect containers before use.	Sanitise contaminated environment, tools and containers.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- Regularly clean and sanitise all working areas, storage areas and equipment linked to potting.

#### Record keeping

- Materials inspection and corrective action record
- Facility hygiene checklists
- Potting production records
- Monitoring and corrective action record

## 8.2. Growing

### 8.2.1. Growing Areas – all types

Plants in growing areas (greenhouses, container standing out beds, in the field etc) are exposed to a wide range of biosecurity hazards. Sources include nursery activity, facility management and condition, neighbouring areas and environmental issues – weather! Many are mitigated through sound nursery hygiene and good facility design and construction. Regular and thorough crop monitoring will detect emerging issues early and provide the best opportunity to take corrective action.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant growth while in		<b>Introduction of pests to growing areas via:</b>	Construct greenhouses, growing areas and benches from materials	Treat contaminated growing facilities

growing areas		<ul style="list-style-type: none"> <li>• Contamination from growing facilities.</li> <li>• Contamination from tools, equipment and vehicles.</li> <li>• Workers introducing pests from elsewhere on site.</li> <li>• Contamination from surrounding properties or areas.</li> <li>• Weeds in growing area or nearby harbour insect, hitchhiker or pathogen pests.</li> <li>• Contamination from visitors and their vehicles.</li> </ul>	<p>that isolate plants from potential contamination.</p> <p>Construct growing areas so that water drains freely and does not accumulate on the surface.</p> <p>Adopt strong facility, equipment and worker hygiene measures</p> <p>Provide appropriate boundary buffer zones.</p> <p>Ensure growing and adjacent areas are free of pests. If this is not practicable, undertake enhanced boundary monitoring.</p> <p>Keep weeds under control.</p> <p>Clear signage and fencing to direct visitors to nursery office.</p> <p>Limit access to only authorised people and vehicles.</p> <p>Provide foot baths/brushes for visitors.</p> <p>Provide washdown site for any vehicles that enter growing areas.</p> <p>Undertake routine pest monitoring and crop inspections.</p>	<p>appropriately.</p> <p>Identify pests, their signs and/or symptoms and treat appropriately.</p> <p>Undertake diagnostic testing where signs and/or symptoms are unable to be identified and treat appropriately.</p> <p>Reject, or isolate and treat affected plants.</p>
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APP = tick this column if the step, action or hazard applies to your nursery.

#### Myrtle Rust specific measures

- Aggregated myrtaceous species within a defined area of the nursery for ease of inspection and treatment and ideally away from other locally growing myrtaceous species.

#### Kauri Dieback specific measures

- Establish a holding period of at least 3 months from potting prior to dispatch.
- Kauri plant batches should be kept separate through this period, and away from propagation areas and other plants.

#### Record keeping

- Production records
- Monitoring and corrective action record

### 8.2.2. Nutrition Amendment – top dressing and/or fertigation

Contamination risks from nutrition amendment in the growing area arise from workers who may introduce pests from other parts of the nursery or from offsite. and possibly from contaminated fertilisers, manures or fertigation systems/solutions.

Measures to manage these risks include sound nursery hygiene and processes described above for fertiliser sourcing and storage and irrigation.

POTENTIAL HAZARDS				
Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Nutrition amendment		Plants are contaminated by workers or equipment while applying fertiliser.  Fertiliser and manure are contaminated.  Water used in fertigation solutions is contaminated.	Adopt strong facility and worker hygiene measures.  Refer Fertilisers – section 8.1.3.  Check water quality regularly and treat as appropriate.	Treat water.  Rectify issues arising from poor irrigation design.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Production records

### 8.2.3. Crop Protection – pest, pathogen and weed control

An appropriate **crop protection plan** comprises sound management practices through the growing cycle utilising cultural practices, crop monitoring and a combination of preventive and remedial measures.

The plan will identify key pest threats, monitoring and subsequent corrective actions.

If agrichemicals are applied, the plan will have been developed to ensure the use of effective and appropriate agrichemicals, off-label use evaluation, and include product rotation to minimise the risk of resistance build-up.

The plan will have also considered whether the treatments selected kill the pest, or simply mask symptoms. This is common with some fungicides for some pathogens; some phytophthora's for example are only suppressed and can manifest after fungicide applications end, and when the plants are distributed from the nursery.

Agrichemical practices shall be in accordance with associated agrichemical regulations such as the Agrichemical Code of Practice (NZS 8409 2004), regional council regulations and supported by appropriate training and supervision. Records shall be kept of all agrichemical applications and weather conditions at time of application.

POTENTIAL HAZARDS				
Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Pest, pathogen, insect and weed management		Plants are destroyed by or lose value through the presence of pests.	Develop a crop protection programme including: <ul style="list-style-type: none"> <li>• Key pest issues/concerns</li> <li>• Monitoring and corrective action procedures</li> <li>• Agrichemical selection parameters, if any.</li> <li>• Maintain vigilance.</li> </ul> Maintain agrichemical application	Identify pest symptoms and treat appropriately.  Undertake diagnostic testing where pests, signs and/or symptoms are unable to be identified and treat appropriately.  Service and calibrate equipment as appropriate.

equipment to a high standard.  
 Train workers in appropriate use of equipment and agrichemicals.  
 Ensure agrichemical product rotation to minimise the risk of resistance build-up.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Myrtle Rust specific measures

- Undertake preventative fungicide applications at appropriate high and low risk seasonal rates.

#### Phytophthora specific measures

- Avoid application of fungicides for the control of *Phytophthora* (eg phosphites). These can delay onset of symptoms in plants that are already infected.
- Remove suspect plants to isolation area immediately, identify original location and monitor nearby plants for symptoms.

#### Record keeping

- Production records

### 8.2.4. Weed management

The nursery's **crop protection plan** needs to address weed management through the growing cycle utilising cultural practices, crop monitoring and a combination of preventive and remedial measures. If a weed species is used as a cover crop, include measures to prevent weeds or seeds being distributed at shipping.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Weed management		<p>Production efficiency is reduced through weed growth which robs plants of water and nutrients and creates extra work.</p> <p>Weeds growing in or around the nursery can harbour pests.</p> <p>Weeds shipped with plants may spread weeds to areas where they are not</p>	<p>Use the crop protection plan to describe how you manage weed risk stop them spreading through your crops and from within the nursery site, along boundaries, neighbouring properties, via visitors, nursery inputs, packaging and storage of the same, and on growing beds between crop rotations in growing areas.</p> <p>Do not allow weeds to flower and set seed.</p> <p>Remove all weeds as soon as practicably possible.</p> <p>Inspect plants before they ship and remove all visible weeds and weed seed.</p>	Identify weed infestations and treat promptly.

established.

APP = tick this column if the step, action or hazard applies to your nursery.

### Record keeping

- Production records

## 8.3. Dispatch

Plant dispatch processes are the last step in ensuring that the risk of a producer spreading pests to their customers is minimised. Hygienic handling, careful inspection (and corrective action if necessary) and clean shipping containers, packaging and materials are key steps to safeguard clean plants, a producer's reputation and their customer's interests.

### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Order picking		Contamination of plants through handling, tools and equipment.	Adopt strong facility and worker hygiene measures.	Report detection of affected plants. Treat or reject as appropriate.
Transport to dispatch area		Contamination of plants during transport.	Clean and sanitise cutting tools. Clean vehicles, trailers, carts etc as appropriate.	Disinfest contaminated equipment
Detailing		Contamination of plants through handling, tools and equipment. Build-up of pests in plant waste and other materials.	Adopt strong facility and worker hygiene measures. Clean and sanitise cutting tools. Check, clean, disinfest.	Report detection of contaminated plants. Treat or reject as appropriate.
Packing		Packaging, trolleys, pallets, cartons and other materials are contaminated.	Check, clean, disinfest.	Treat or reject contaminated materials

APP = tick this column if the step, action or hazard applies to your nursery.

### Myrtle Rust specific measures

- Complete the Myrtle Rust Biosecurity Declaration and provide it your transporter and customer.

### Record keeping

- Monitoring and corrective action records
- Dispatch and traceability records

## 8.4. Plant Distribution and Transport

Plant distribution and transportation provides a key control point in the management of pest spread. Pests may be spread on the plants themselves, packaging or on the vehicles undertaking transport.

Plant Producers shall provide transport operators (including their own drivers) assurance that the plants and their packaging have been inspected and signed off prior to shipping.

Transport operators should not accept shipments unless they receive appropriate shipping signoff from the Nursery Manager or delegated person. Further, they shall ensure that their trucks are kept clean and that plant debris are not left to build-up on the truck deck.

Transport operators shall have a Standard Operating Procedure describing measures to manage plant debris is on trunk decks.

### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant and other organic debris build-up on trunk decks and shelving.		Contamination of plants from pests in the debris.	Sweep the deck clear as the opportunity arises while travelling, or when empty, or at least weekly.  Inspect plants and report the presence of any pests, symptoms and/or signs.	If the pest or symptoms and/or are detected, clean, wash, and sanitise truck deck, shelving, walls and equipment as appropriate.
Plants from other nurseries		Contamination from co-shipped product.	Only carry product from trusted nurseries and where the appropriate Nursery Dispatch Declaration has been provided.  Inspect plants and report any symptoms.	If the pest or symptoms and/or signs are detected, clean, wash and sanitise truck deck, shelves, walls and equipment as appropriate.
Vehicle contamination		Contamination from pests on the vehicle.	Clean vehicles on a regular basis paying attention to built-up soil and plant materials.	
Contamination introduced by the driver			Drivers maintain hygiene measures, for example when arriving on site or before and after handing plants drivers should: <ul style="list-style-type: none"><li>• Inspect clothing and footwear for contamination</li><li>• Wash hands and gloves.</li></ul>	

Couriers		Contamination from other freight stacked on top of open cartons.		
APP = tick this column if the step, action or hazard applies to your nursery.				
<hr/> <p><b>Myrtle Rust specific measures</b></p> <ul style="list-style-type: none"> <li>• Adopt appropriate Myrtle Rust Plant Transport Protocols to manage the risk of spreading myrtle rust.</li> </ul>				
<hr/> <p><b>Record keeping</b></p> <ul style="list-style-type: none"> <li>• Dispatch clearance register</li> <li>• Vehicle hygiene and corrective action log</li> </ul>				

## 9. Part C2: Hazard Management – Container Production

- Part C2 relates to plant producers who undertake all or part of their production using containers (pots, bags, trays ...)
- It follows from **Part C1 – #8: All Plant Production** which applies to all plant producers and their nursery(s) irrespective of the methods they use to grow their plants.

### 9.1. Transplant – Container Production

#### 9.1.1. Transport to and Placement in Container Growing Area

As newly potted container stock is transported to the growing area it is at risk of contamination from equipment and workers. The presence of standing water on roadways, possibly harbouring pathogens, also presents a hazard to nearby stock from water splash.

Growing areas should be cleaned and sanitising before place new plants on ground previous occupied by other plants; contamination risks also arise from debris and waste from prior crops.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Transport to growing area		Contamination of plants from workers and transport equipment. Contamination of plant stock near roadways by water splash from standing water.	Maintain worker hygiene measures. Clean and sanitise transport equipment on a regular basis. Construct paths and roadways to eliminate standing water.	Treat contaminated plants. Sanitise contaminated equipment.
Placement containers in in growing area.		Contamination of plants from workers. Contamination from prior batches/crops.	Maintain facility and worker hygiene measures. Clean and sanitise container growing area prior to placement of new crops.	Sanitise contaminated environment, tools and containers.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Facility hygiene checklists
- In-between crops clean up records
- Production records

### 9.2. Growing – Container Production

#### 9.2.1. Growing Areas – container production



Plants in growing areas (greenhouses, container standing out beds, in the field etc) are exposed to a wide range of biosecurity hazards. Sources include nursery activity, facility management and condition, neighbouring areas and environmental issues – weather! Many are mitigated through sound nursery hygiene and good facility design and construction.

Regular and thorough crop monitoring will detect emerging issues early and provide the best opportunity to take corrective action.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant growth while in container growing areas		Pest accumulation of waste materials, prunings and trimmings.	Keep growing and nearby areas clear of waste materials.	Treat contaminated growing areas and affected plants.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- If possible, breakup long blocks of host plants to provide buffer to limit spread from through blocks.
- Ideally grow plants on benches at least 90cm off ground.
- Avoid wooden bench tops.
- Space benches, beds and crops to minimise risk of crop to crop splash.
- Space plants to minimise risk of pot to pot splash.
- Isolate potential contamination sources (trash bins, dirty pots ...).
- Avoid dust and splash when cleaning.

#### Record keeping

- Production records
- Monitoring and corrective action record

### 9.2.2. Plant Handling – container production

Contamination risks when handling plants (moving, spacing, staking, pruning, shaping and other activities to manage growing plants) can arise from workers who may introduce inadvertently pests from other parts of the nursery (or from offsite) and from contaminated equipment and tools.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant shape and growth management and maintenance.		Plants are contaminated by workers or equipment while being handled. Contamination of wounds generated	Adopt strong facility and worker hygiene measures. Preventative sprays after wounds made. Clean and sanitise tools after a set time at start and end of	Treat infected plants as appropriate.

	through pruning and training. Contamination risks from pest accumulation in organic waste and pruning materials. Contamination from machinery.	day and between crops and/or blocks. Remove waste daily. Sanitise machinery that has been on another nursery, horticultural property or park or garden.
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APP = tick this column if the step, action or hazard applies to your nursery.

### Phytophthora specific measures

- Avoid unnecessary movement or rearranging of plants on the growing bed. If a disease is developing, it is important to be able to notice patterns as they might develop across a crop.
- Discard plants that have been in contact with ground or un-sanitised surfaces.
- Consider post-pruning fungicide to protect wounds.

### Record keeping

- Production records
- Corrective action register

## 9.2.3. Irrigation – container production

Irrigation water is sourced from a wide range of sources, some of which are more susceptible to contamination than others and will require testing and treatment where appropriate.

- Water from town supply, deep wells, bores and clean roof catchments presents a low hazard and does not require testing or treatment, unless there known issues and/or concerns are raised.
- Water from surface features (rivers, ponds, dams) presents a hazard. Annual testing for pathogens is warranted and where risks are identified and confirmed, appropriate treatment measures should be introduced.
- Water stored in a way that exposes it to the risk of contamination (for example, in dams, ponds and uncovered tanks) should be tested for pathogens annually and treated if required.
- Recycled water presents a high contamination hazard and will need to be treated prior to reuse and should be tested for pathogens at least annually

Plant Producers should undertake a risk analysis and undertake testing and treatment as appropriate.

Laboratories who undertake plant health pathogen testing may be able to assist with pathogen testing in irrigation water, check the Plant Pass “Pest identification and diagnostics – guidance” paper for contacts.

In a survey of labs in October 2019, two listed this service specifically:

- Plant Diagnostics Limited in Christchurch - [plantdiagnosticslimited.co.nz](http://plantdiagnosticslimited.co.nz), 03 377 9026
- AsureQuality Plant Health Lab, Lincoln - [asurequality.com/our-industries/horticulture/pest](http://asurequality.com/our-industries/horticulture/pest), 0508 00 11 22

### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Irrigation		Plants are contaminated from water-borne	Check water quality regularly	Treat water.

	<p>pathogens.</p> <p>Growing areas are poorly drained enabling pathogen build-up in standing water.</p> <p>Recycled water is contaminated.</p>	<p>and treat as appropriate.</p> <p>Clean and sanitise water tanks and irrigation lines at least annually.</p> <p>Use backflow preventers in lines to eliminate risk of contamination moving upstream.</p> <p>Sanitise irrigation equipment if moved between blocks.</p> <p>Construct growing areas so that water drains freely and does not accumulate on the surface.</p> <p>Run-off from growing and adjacent areas should be directed away from growing areas, and if recycled treated appropriately.</p> <p>Treat recycled water.</p>	<p>Rectify issues arising from poor irrigation design and/or run-off management.</p>
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APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- In preference and where practicable, avoid overhead irrigation.
  - If irrigating overhead, schedule for times where leaf surfaces will dry quickly
- Use low water pressure to avoid splash.
- Avoid overwatering.

#### Kauri Dieback specific measures

- Measures for Phytophthora above and ...
- Avoid use of recycled water.

#### Record keeping

- Water test records where applicable.
- Water treatment records – where water sources require treatment or where water is recycled.

#### Plant Pass Scheme support materials

- Pest identification and diagnostics - guidance

## 10. Part C3: Hazard Management – Bare Root & Field Production

- Part C3 relates to plant producers who undertake production steps that include growing plants in the field, that is, part of the production cycle includes plants being grown directly in soil.
- It follows from **Part C1 – #8: All Plant Production** which applies to all plant producers and their nursery(s) irrespective of the methods they use to grow their plants.

### 10.1. Transplant – Bare Root & Field Production

#### 10.1.1. Transport to and Planting in Field

As newly prepared stock is transported and planted in the field it is at risk of contamination from equipment and worker. The presence of standing water on roadways, possibly harbouring pathogens, also presents a hazard to nearby stock from water splash. Sound nursery hygiene practices are critical to growing and protecting young plant stock.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Transport to growing area		Contamination of plants from workers, equipment and during transportation.  Poor roadway design enabling build up of standing water and possible contamination through water splash.	Adopt strong worker hygiene. Clean and sanitise transport equipment on a regular basis at the start of the day.  Use covered in transport if going off site while transporting plants to avoid both stress and possible contamination.  Construct paths and roadways to eliminate standing water.	Treat contaminated plants. Sanitise contaminated equipment. Undertake road repair.
Planting stock in field.		Contamination of plants from workers and equipment.  Contamination from prior crops.	Adopt strong facility and worker hygiene measures. Adopt appropriate clean-up and disinfestation and pre-plant pest check practices and undertake prior to planting new crops.  Cover crops (eg mustard), spray applications and groundwork as appropriate.	Sanitise contaminated environment, tools and containers.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Production records
- Facility hygiene checklists
- Monitoring and corrective action record

## 10.2. Growing – Bare Root & Field Production

### 10.2.1. Growing Areas – Bare root & field production

Plants in growing areas are exposed to a wide range of biosecurity hazards. Sources include nursery activity, facility management and condition, neighbouring areas and environmental issues – weather! Many are mitigated through sound nursery hygiene and good facility design and construction.

Regular and thorough crop monitoring will detect emerging issues early and provide the best opportunity to take corrective action.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant growth while in field growing areas		<p><b>Increase in pest populations through the growing cycle via:</b></p> <ul style="list-style-type: none"> <li>• Pathogen spread through poorly designed and drained growing areas.</li> <li>• Contamination build up through the growing cycle.</li> <li>• Soil borne pathogens build in field production areas up over time.</li> </ul>	<p>Construct growing areas so that water drains freely.</p> <p>Avoid working field sites in conditions that promote pest spread.</p> <p>Clean and treat growing areas between batches.</p> <p>Rest or rotate field production areas on an appropriately scheduled basis.</p> <p>Fallow period with cover crop.</p> <p>Undertake testing for soil and water borne pathogens as appropriate.</p>	<p>Treat contaminated growing areas appropriately.</p> <p>Reject, or isolate and treat affected plants.</p>

APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- Avoid in-ground nursery production wherever possible.
- Plants grown in-ground cannot be considered free of *Phytophthora*.
- Mulch field-growing plants to minimise risk of water splash and *Phytophthora* being spread from soil to foliage.

#### Record keeping

- Production records
- Monitoring and corrective action record

### 10.2.2. Plant Handling – bare root and field production

Contamination risks when handling plants (moving, spacing, staking, pruning, shaping and other activities to

manage growing plants) can arise from workers who may introduce inadvertently pests from other parts of the nursery (or from offsite) and from contaminated equipment and tools.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant shape and growth management and maintenance.		Plants are contaminated by workers or equipment while being handled. Contamination of wounds generated through pruning and training. Contamination risks from pest accumulation in organic waste and pruning materials. Contamination from machinery.	Adopt strong facility and worker hygiene measures. Preventative sprays or wound dressings in the case of large cuts applied after wounds made. Clean and sanitise tools after a set time (completion of a block or bay, plant, row, lot, determined by nursery). Manage pruning materials and organic waste as appropriate with season and crops. Machinery wash down and cleaning procedures – between blocks. Machinery wash down site contained at one location. Sanitise machinery that has been on another nursery, horticultural property or park or garden.	Treat infected plants as appropriate.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Phytophthora specific measures

- Consider post-pruning fungicide to protect wounds.

#### Record keeping

- Production records
- Corrective action register

### 10.2.3. Harvest from field

Contamination risks during harvest can arise from workers who may introduce pests from other parts of the nursery (or from offsite), through handling and from contaminated equipment and tools. Contamination risks may also arise during transport from field to storage or for further processing.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Harvest		Transmission of pests	Adopt strong facility and	Treat contaminated

inground plants and prepare for dispatch or moving to another nursery location		though handling	worker hygiene measures. Harvest plants into bins lined with clean or sanitised bags. Transport to processing shed/storage as soon as possible after harvest. Hygiene controls for vehicle/equipment wash down areas. Handle only one bin of product at a time – effectively placing everything in quarantine.	plants as appropriate.
Transport to store or to processing		Transmission of pests through handling and transport carrier.	Hygiene controls for transport vehicle/equipment. Covered transport and/or enclosed bins/plants. Approved carrier.	Transport hygiene actions. Carrier selection.

APP = tick this column if the step, action or hazard applies to your nursery.

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**Record keeping**

- Production records
- Corrective action register

### 10.3. Handling of Field Grown Plants Post Lifting

Plant processes from harvest prior to final dispatch are vital in ensuring that the risk of a producer spreading pests within their site, and to their customers is minimised. Hygienic handling to avoid cross contamination risk between unprocessed and processed plants, careful inspection (and corrective action if necessary) and clean shipping packaging/containers and materials are key steps to safeguard plant health, the producer’s reputation and the interests of the customer.

#### 10.3.1. Storage Prior to Processing

Contamination risks during Storage Prior to Processing can arise from staff who may introduce pests from other parts of the store (or from offsite), through handling, from contaminated equipment, tools and storage facilities, and from adjacent external environs.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Receival of lifted plants		Transfer of Contamination to other clean plants or environs.	Adopt strong facility and staff hygiene measures. Receive lifted plants in a different place /area of store to processed plants.	Report detection of affected plants or environs. Treat or reject as appropriate.

Storage of lifted plants		Transfer of contamination to other clean plants or environs through handling, tools and equipment.	Adopt strong facility and staff hygiene and access measures. Store lifted plants in a different place /area of store to processed plants.	Report detection of affected plants. Treat or dispose of affected plants as appropriate.
Transport to processing area		Contamination of plants during transport.	Clean and sanitise tools, vehicles, trailers, carts etc. as appropriate.	Disinfest contaminated equipment.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Storage, transport, monitoring and corrective action records
- Dispatch and traceability records

### 10.3.2. Processing of Field Grown Plants

The aim of Plant processing is to remove contamination, resulting in a cleaner product going to the client. Processing is to be done in suitable facilities, using trained staff, clean equipment, inputs and materials, in order to achieve this aim.

Once processing has been completed, it is vital that steps are in place to prevent the risk of recontamination of plants prior to receipt by the client. Potential steps to lessen the risk of recontamination of plants would be to use clean packaging off the processing line, and to keep processed plants physically separated from plants waiting to be processed.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Receival from store or field		Contamination of clean processed plants from lifted, unprocessed plants. Contamination of other plants through handling, tools and equipment.	Adopt strong facility and staff hygiene measures. Follow correct process flows and keep physical separation of processed and unprocessed plant lines.	Report detection of affected plants. Treat or reject as appropriate.
Processing		Contamination of plants through handling, tools and equipment. Contamination from water. Build-up of pests in plant waste and other materials.	Adopt strong facility and staff hygiene measures. Ensure water is fit for purpose. Check, clean, disinfest. Washed down plants to go into bin lined with new clean bag/bin liner. Pest inspections by trained staff. Ensure all waste is contained and disposed of appropriately.	Report detection of contaminated plants. Treat or source water appropriately. Treat or reject as appropriate. Train staff appropriately for task.



		Pests in cool storage	Plants dipped into chemical fungicide prior to cool storage. Dipping mixture is changed regularly (defined through testing of chemical mix to make sure it is still active and no build-up of bacteria).	
Packing		Packaging, trolleys, pallets, cartons, bins, liners and other materials are contaminated	Check, clean, disinfect.	Treat or reject contaminated materials.
Transport from processing to dispatch area/store		Contamination of plants during transport.	Clean and sanitise tools, vehicles, trailers, carts etc as appropriate.	Disinfect contaminated equipment.

APP = tick this column if the step, action or hazard applies to your nursery.

#### Record keeping

- Monitoring and Corrective Action records
- Receival, Dispatch to store, and traceability records
- Staff training, especially for staff completing inspections
- Process inputs: Process water (source/type) and testing, and final packaging inspections

### 10.3.3. Storage of Processed Field Grown Plants

Correct storage of Processed Field Grown Product prior to dispatch is essential to control and maintain the hygiene levels achieved during processing.

#### POTENTIAL HAZARDS

Step /Action	APP	Hazard	Common Control Measures	Corrective Actions
Plant movement, inspection and handling within store		Contamination of plants through handling, tools and equipment or environs (internal and immediate external).	Adopt strong facility and staff hygiene measures.	Report detection of affected plants. Treat or reject as appropriate.
		Pests in cool storage.	Regular inspection of plants in storage.	Plants sprayed or dipped with chemical fungicide as required/if issue identified during storage.
Transport to dispatch area		Contamination of plants	Clean and sanitise tools, vehicles, trailers, carts etc. as	Disinfect contaminated

		during transport.	appropriate.	equipment.
APP = tick this column if the step, action or hazard applies to your nursery.				
<hr/> <p><b>Record keeping</b></p> <ul style="list-style-type: none"> <li>• Monitoring and corrective action records</li> <li>• Receiving/Dispatch and traceability records</li> </ul>				