



NEW ZEALAND

PLANT PRODUCTION
BIOSECURITY SCHEME

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Phytophthora agathidicida

Schedule

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Phytophthora agathidicida Schedule

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Updates

The Plant Production Biosecurity Scheme (PPBS) 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 in 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 PPBS experience and/or new science inform the need for change. Revisions published on the Scheme's website [to follow] 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 PPBS or by email to [in the interim office@nzppi.co.nz].

Acknowledgements

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Disclaimer

While the PPBS's objective is to allow certification of plant producers and confidence that the 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. PPBS accepts no liability for claims regarding the presence of pests in any plants produced by registered and/or certified producers. While the objective of the PPBS standards and guidance is to minimise the potential risk pest, no party can guarantee that adherence to these standards and guidance will reduce such risk to zero.

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Phytophthora agathidicida Schedule

measures to manage *Phytophthora agathidicida* in addition to the core standard, its checklist and the Phytophthora Specific Module

Phytophthora agathidicida Schedule

1. Purpose

This document is a Schedule under the PPBS Phytophthora Specific Module that pertains to plant producers who grow *Agathis australis* (kauri). It supplements the Core Standard of the Plant Production Biosecurity Scheme (PPBS, the Scheme), and describes specific measures to manage the risk of a nursery becoming infected by or spreading the pathogen *Phytophthora agathidicida* (kauri dieback).

2. Introduction

Kauri dieback is an incurable, fatal disease caused by the oomycete *Phytophthora agathidicida* (Pa) which affects NZ's iconic kauri (*Agathis australis*). Symptoms include root rot and associated rot in a collar around the base of the tree, bleeding resin, yellowing and chlorosis of the leaves followed by extensive defoliation, and finally, death.

The pathogen was first detected in NZ kauri in 1972; it continues to spread and is the subject of extensive disease management efforts by regional authorities and the National Kauri Dieback Programme. A National Pest Management Plan is currently being developed.

Plant producers play an important role in protecting kauri. Nurseries provide ideal conditions for *Phytophthora* development. If *Phytophthora agathidicida* is introduced to a nursery, it can rapidly spread through young kauri crops in the nursery, and in turn, to kauri forests, restoration areas, amenity plantings and home gardens as infected (and possibly asymptomatic) plants are shipped from nurseries.

Key opportunities for *Phytophthora* to enter a nursery and spread through its production cycle include:

- Contaminated propagules or imported infected (but possibly asymptomatic) plant materials and any associated substrates (soil and or potting media for example)
- Contaminated water, potting and growing media or pots.
- Poor sanitation practices and use of contaminated equipment through the production cycle.

3. Scope

Measures described in this *Phytophthora agathidicida* Schedule are designed to manage biosecurity risks for all plant producers who grow *Agathis australis* (kauri).

This Schedule supplements the PPBS Core Standard and the *Phytophthora* Specific Module and should be read in association with that standard and module. Certification to the *Phytophthora agathidicida* Schedule relies upon and can only be granted by the PPBS where a plant producer meets the requirements for certification to the Core Standard.

While at the time of writing (November 2019) the Schedule only applies to producers who grow *Agathis australis* (kauri), if additional plant species are identified as hosting or vectoring *Phytophthora agathidicida*, the Schedule will be extended to growers of those plant species.

NOTE: The Biosecurity Act 1993 mandates actions which if they are instigated by MPI over-ride this module.

4. Managing Nursery Risk

Phytophthora risk management in nurseries is focused on an integrated approach to prevent *Phytophthora* from entering the nursery and its subsequent spread through the production cycle through to out planting. It is necessary to adopt an entire clean production system to achieve the goal of producing healthy plants, this includes a high standard of nursery hygiene: clean stock, clean soil, clean water. The PPBS and this Schedule forms the basis of measures to prevent the introduction of *Phytophthora* into nursery stock rather than attempting to suppress it after plants are already infected. If there is no *Phytophthora*, there will be no *phytophthora* diseases.

The PPBS provides a layered approach to *Phytophthora agathidicida* risk management:

1. The Scheme's **Core Standard** and **Guidance** acknowledges diversity among the nursery industry 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. It focuses on core biosecurity best practice encompassing management and staff 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.
2. The ***Phytophthora* Specific Module** identifies further measures that should be undertaken by plant producers who grow plants species which are susceptible to *Phytophthora* or distribute plants to markets or environments where *Phytophthora* is an identified risk – example, avoiding application of fungicides for the control of *Phytophthora* (eg phosphites) which can delay onset of symptoms in plants that are already infected.
3. This ***Phytophthora agathidicida* Schedule** drills down further identifying measure specific to managing **kauri dieback risk** – example, mandating 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.

A hierarchy of risk management is established:

1. The PPBS Core Standard and PPBS Guidance establish broad measures and guidance.
2. The *Phytophthora* module guidance describes measures relevant to all *Phytophthora* species.
3. This *Phytophthora agathidicida* Schedule focus on additional measures to protect kauri.

All three help protect a plant producer growing kauri and the markets and environments they ship their plants to.

5. Nursery measures

The following tabulation identifies

1. The key *Phytophthora agathidicida* risk issues.
2. **Mandated *Phytophthora agathidicida* Schedule measures** – that is additional audited Standard requirements.
3. Cross reference to the Core Standard's generic requirements and mitigations described in PPBS Guidance materials.
4. Additional guidance to manage *Phytophthora agathidicida* risk.

While not yet included it is envisaged that future editions of this Schedule will require diagnostic testing prior to distributing kauri from nurseries. Work is needed to establish effective and cost-efficient tests and this Schedule will be updated when these are available and a requirement for diagnostic testing prior to distributing kauri from nurseries is established.

5.1. Management and worker awareness

Risk issue	<i>Phytophthora agathidicida</i> can be spread or unnoticed by workers as they go about routine nursery activities.	
<i>Phytophthora agathidicida</i> Schedule Measures	The plant producer shall be able to provide evidence of <ul style="list-style-type: none"> • Training processes that include kauri dieback awareness, issues and what to look for and how to respond if signs or symptoms of kauri dieback are suspected. 	
Core Standard & Guidance	6.3	Worker training
Additional guidance	<ul style="list-style-type: none"> • Signs and symptoms kauri dieback disease are noted at https://www.kauridieback.co.nz/recognising-symptoms/ 	

5.2. Risk activity

Risk issue	Kauri production is often undertaken in association with kauri forest activities giving rise to the risk that kauri dieback disease can be transferred between the nursery and forests and vice versa.	
<i>Phytophthora agathidicida</i> Schedule Measures	The plant producer shall be able to provide evidence of <ul style="list-style-type: none"> • 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. 	
Core Standard & Guidance	7.2	Hygiene
Additional guidance	<ul style="list-style-type: none"> • The disinfectants Virkon® S, Janola®, and Sterigene have been tested and proven effective against <i>Phytophthora agathidicida</i>. • Use of dedicated clothing and footwear for forest work change before re-entering the nursery. 	

5.3. Crop Monitoring

Risk issue	Disease symptoms unnoticed in the nursery can lead to production losses and risk of further spread.	
<i>Phytophthora agathidicida</i> Schedule Measures	The plant producer shall be able to provide evidence of <ul style="list-style-type: none"> • A monthly monitoring programme with documented procedures, with outcomes kept on record for a minimum of three years. 	
Core Standard & Guidance	7.3	Crop monitoring
Additional guidance	<ul style="list-style-type: none"> • NOTE – <i>Phytophthora agathidicida</i> is an “unwanted organism” under the Biosecurity Act. Under section 53 of the Biosecurity Act it is an offence to sell or propagate plants that one suspects contain an unwanted organism, 	

	<ul style="list-style-type: none"> • Signs or symptoms of <i>Phytophthora agathidicida</i> 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. • They will advise diagnostic testing or disposed of as waste material: <ul style="list-style-type: none"> ○ 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 and 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 <p>If there is no landfill near you, seek direction from the Kauri Dieback Programme.</p>
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5.4. Traceability

Risk issue	In the event of <i>Phytophthora agathidicida</i> being detected in a nursery is it essential to understand where it may have come from, how it entered the nursery and where, if any, infected plants may have been distributed.	
<i>Phytophthora agathidicida</i> Schedule Measures	<p>The plant producer shall be able to provide evidence of</p> <ul style="list-style-type: none"> • A strict batching process for kauri crops where plants from each seed sowing and/or potting activity are treated as a separate batch. • That larger batches of kauri are split into smaller sub-batches to limit risk of inadvertent contamination spreading more widely. 	
Core Standard & Guidance	7.4	Traceability
Additional guidance	<ul style="list-style-type: none"> • Strong traceability records identifying the origin of kauri plant material and how it progresses through the nursery and through to the customer or planting site will enable rapid location of potential infection sites should kauri dieback be detected at any stage of production. 	

5.5. Seed collection

Risk issue	While seed is recognised as an unlikely pathogen carrier, seed collection activities present a risk and there is a risk of other contaminated materials being inadvertently brought back from the seed source to the nursery.	
<i>Phytophthora agathidicida</i> Schedule Measures	<p>The plant producer shall be able to provide evidence of</p> <ul style="list-style-type: none"> • Polices and/or processes to ensure cones and seed is collected only <ul style="list-style-type: none"> ○ from areas where <i>Phytophthora agathidicida</i> is believed absent and ○ from healthy trees with good foliage cover and showing no signs of yellowing leaves or any trunk lesions in the lower trunk area. • Polices and/or processes to ensure to ensure cones are free from soil contamination. 	
Core Standard & Guidance	8.1.1	Plant stock for propagation and/or planting
Additional guidance	<ul style="list-style-type: none"> • Cones containing seeds should be collected from at least 1m above the ground to be sure it has not had contact with contaminated soil or leaf litter. 	

5.6. Growing media

Risk issue	Contamination from growing media that may have been sourced from <i>Phytophthora agathidicida</i> infected components and/or recycled in the nursery.	
<i>Phytophthora agathidicida</i> Schedule Measures	<p>The plant producer shall be able to provide evidence of</p> <ul style="list-style-type: none"> • Sourcing growing media only from reputable commercial suppliers. • Policies to ensure growing media is free of soil or materials sourced from kauri forests • Policies to ensure growing media is not reused. • Processes to clean and <u>sanitise</u> between mixes bulk bin (where used) between mixes. 	
Core Standard & Guidance	8.1.2	Growing media
Additional guidance	<ul style="list-style-type: none"> • Ensure growing media is free draining with good water holding capacity. 	

5.7. Containers – pots, bags, trays ...

Risk issue	<i>Phytophthora agathidicida</i> oospores are robust and long-lived. Soil and plant debris on recycled growing containers (pots, bags, trays ...) is a risk.	
<i>Phytophthora agathidicida</i> Schedule Measures	<p>The plant producer shall be able to provide evidence of</p> <ul style="list-style-type: none"> • Thorough cleaning and <u>sanitation</u> of reused containers (if any). 	
Core Standard & Guidance	8.1.4	Containers (pots, bags, trays ...)
Additional guidance	<ul style="list-style-type: none"> • If possible, only use new containers, and store these to avoid contamination. 	

5.8. Growing

Risk issue	Nursery kauri stock is at risk from other kauri plants and contaminations sources during the growing cycle, including wild animals that present a risk of introducing contaminated soil this (eg wild pigs).	
<i>Phytophthora agathidicida</i> Schedule Measures	<p>The plant producer shall be able to provide evidence of</p> <ul style="list-style-type: none"> • Processes to ensure all kauri plants should be checked prior to handling, movement or planting. • Use of footbaths or disposable plastic shoes before entering kauri propagation areas. • Where the nursery is in a rural area and near-forest blocks, robust fencing to prevent wild animal access If the nursery is in remote rural locations or near forest or native bush blocks. • Irrigation of kauri blocks does not use recycled water. 	
Core Standard & Guidance	8.1.5 8.2	Propagation Growing

	9.2 9.2.3	Growing – container production Irrigation – container production
Additional guidance	<ul style="list-style-type: none"> Unhealthy plants and plants from batches where there is any rapid unexplained decline or death should not be moved, sold or planted – contact the Kauri Dieback Programme – see below 	
5.9. Pre-dispatch holding		
Risk issue	Plants that are asymptomatic at potting may contain <i>Phytophthora agathidicida</i> which could be spread with plants as they are shipped from the nursery.	
<i>Phytophthora agathidicida</i> Schedule Measures	The plant producer shall be able to provide evidence of <ul style="list-style-type: none"> A holding period of at least 3 months from potting prior to dispatch Kauri plant batches being kept separate through the holding period and away from propagation areas and other plants 	
Additional guidance	<ul style="list-style-type: none"> This observation period will help increase the likelihood of any asymptomatic infection developing before plants are dispatched to customers or for planting. 	
5.10. Pa testing		
<p>Testing of kauri plants during the production cycle and/or prior to dispatch increases the likelihood of avoiding distribution of infected kauri into forest, restoration, rural and urban areas.</p> <p>While not yet included it is envisaged that future editions of this Schedule will require diagnostic testing prior to distributing kauri from nurseries. Work is needed to establish effective and cost-efficient tests and this Schedule will be updated when these are available and a requirement for diagnostic testing prior to distributing kauri from nurseries is established.</p>		

6. Kauri Dieback Programme

If you have any concerns about the health of your plants or your plants are showing dieback-like signs or symptoms please email kauridieback@mpi.govt.nz.

7. Transitional measures

The requirements of this Schedule become effective six months after this Schedule's adoption to give nurseries with existing kauri crops time to meet audit criteria.

8. Audit Checklist

The *Phytophthora agathidicida* Schedule checklist is part of the PPBS Hazard Management Checklists document – refer Section 22

9. Glossary

The PPBS Core Standard provides definitions for a wide range of Scheme terminology. In addition, the following aid the use of this schedule:

Kauri Dieback (KDB)

An incurable, fatal disease caused by the oomycete *Phytophthora agathidicida* which affects the New Zealand's iconic Kauri (*Agathis australis*).

Pa

See *Phytophthora agathidicida*

***Phytophthora agathidicida* (Pa)**

A soil-borne oomycete which affects the *Agathis australis* (kauri) and causes KDB

Oospore

A robust and long-lived fertilized female egg cell with a thick and persistent cell wall that that can endure in the soil for a considerable time

10. References

Kauri Dieback Programme - www.kauridieback.co.nz