



# Understanding kauri dieback

## Identifying resistance to *Phytophthora* diseases in kauri.



Sap bleeding lesions on kauri caused by PTA.

*Phytophthora* is a group of soil or air borne plant pathogens that pose major challenges to global biosecurity. The pathogens affect an increasingly broad range of hosts worldwide. The rapid movement of organic material between countries has escalated the proliferation of *Phytophthora* related diseases.

Once a *Phytophthora* species is introduced into a new area it will spread naturally through the roots of infected trees. It is often not feasible to eradicate it once established.

Scion's *Phytophthora* research programme focuses on three diseases that are seriously impacting our primary industries and conservation estates: kauri dieback, red needle cast, and crown rot in apples.

## What is kauri dieback?

Kauri dieback is caused by *Phytophthora agathidicida* (PTA). It poses a serious threat to our indigenous kauri with a wide range of social, aesthetic, cultural and environmental impacts. The soil-based pathogens attack the roots of kauri, destroying their ability to draw water and nutrients from the soil. They are spread easily through the transfer of organic matter by people, animals or the transfer of plants from one location to another.

## Research objectives

1. Preservation of the current kauri forests.
2. Understanding the potential for breeding dieback resistance in kauri.
3. Assess kauri's vulnerability to infection by other species of *Phytophthora*.
4. Establish resistant and susceptible lines of kauri for research, propagation and forestry.

## Research questions

- What makes *Phytophthora* species such successful pathogens?
- Can we identify and select for resistance to broad *Phytophthora* resistance?
- Enabling Technology - can we develop a method that is applicable to disease management of other systems?

## In partnership with Māori

- Following Te Aroturuki process of engagement with Māori
- Scientists acknowledge the value of Mātauranga Māori as a source of relevant knowledge
- Working in partnership with the Kauri Dieback Programme Tangata Whenua Roopu.

## Identifying resistance to *Phytophthora*

In addition to kauri dieback, there are two other major *Phytophthora* diseases in New Zealand:

- Red needle cast (caused by *Phytophthora pluvialis*), a new disease of radiata pine, can cause serious losses on some sites.
- Crown rot (caused by *Phytophthora cactorum*) causes significant ongoing root damage and apple tree loss.

We are taking a *Phytophthora*-wide approach to disease breeding, management and research, building on our existing programmes for kauri dieback, red needle cast and other *Phytophthora* species.

Scion has been allocated \$10 million funding from MBIE over the next six years (2013-2019), with significant co-funding from sector groups, to lead a collaborative research programme addressing the biosecurity threat of *Phytophthora* species to New Zealand's forestry, agriculture and natural ecosystems.

## Project collaborators

The project encompasses Scion's Forest Protection, Forest Genetics and Biotransformation teams.

**National collaborators:** Landcare Research, New Zealand Plant & Food Research Ltd, local Māori groups, Massey University and the University of Auckland.

**International collaborators:** Murdoch University, Australia; the University of British Columbia, Canada; Oregon State University, USA; and the University of Exeter, England.

**Co-funders:** Ministry of Business, Innovation and Employment, Forest Growers' Levy Trust, Radiata Pine Breeding Company, Kauri Dieback Programme.

**Programme leader:** Dr Nari Williams, Forest Pathologist for Forest Protection, Scion.

## Contact information

### Scion

Dr Nari Williams  
Phytophthora Research Leader  
Email [nari.williams@scionresearch.com](mailto:nari.williams@scionresearch.com)  
Telephone +64 7 343 5535  
Website [www.scionresearch.com/services](http://www.scionresearch.com/services)

To sign up for our newsletter, go to [www.healthytrees.co.nz](http://www.healthytrees.co.nz)

## About Scion

Scion is the Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other bio-material sectors.

Scion's purpose is to create economic value across the entire forestry value chain, and contribute to beneficial environmental and social outcomes for New Zealand.



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