



UNDERSTANDING KAURI DIEBACK

Identifying resistance to *Phytophthora* diseases in kauri.

HEALTHY TREES, HEALTHY FUTURE

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

Once a *Phytophthora* species is introduced into a new area it will naturally spread 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 agathadicida*. 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 QUESTIONS

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

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.

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.



A stand of kauri affected by kauri dieback.



Sap bleeding lesions on kauri caused by *Phytophthora agathadicida*.

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 that can result in serious losses on some sites.
- Crown rot (caused by *Phytophthora cactorum*) causes significant ongoing root damage and apple tree loss.

Scion has been allocated \$10 million funding from MBIE over the next six years, 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.

Scion is 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.

ABOUT SCION

Scion is a Crown Research Institute that specialises in research, science and technology development for the forestry, wood product and wood-derived materials and other biomaterial sectors. Scion's purpose is to create economic value and contribute to beneficial environmental and social outcomes for New Zealand.

We offer research and development services across the entire forestry value chain, including forest and climate change, forest health and biosecurity, rural fire research, forest management and tree improvement.

PROJECT COLLABORATORS

The project is led by Scion's Forest Protection team and encompasses a range of disciplines across the organisation.

National collaborators: Landcare Research, Plant & Food Research, local Māori groups, Massey University, Auckland University of Technology (AUT) 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.

Healthy trees, healthy future

Enabling technologies to combat *Phytophthora* diseases

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