

Around the world with *Phytophthora* concerns



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Plant pathogen movement: Around the world on planting stock

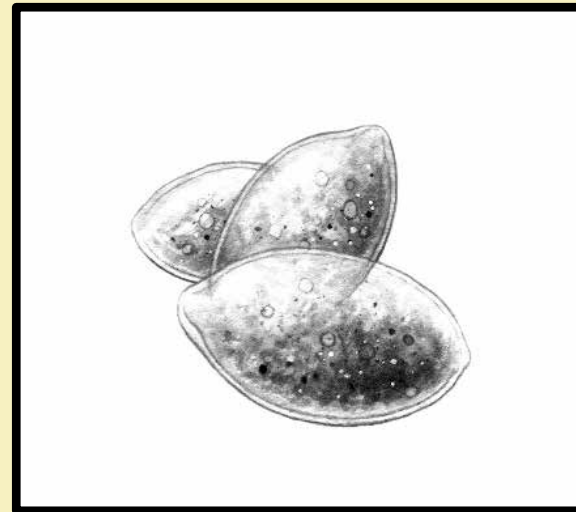
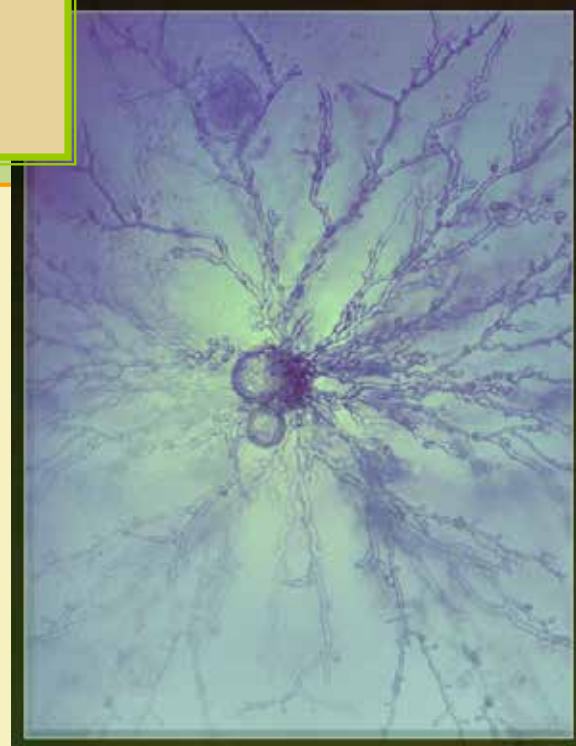
Exotic *Phytophthora* Species in Native Plant Nurseries, Restoration Plantings, and Wildlands

- December 2, 2014

Frankel's conclusion – **PREVENTION** is key

Global review of *Phytophthora* problems on woody plants

-- New developments.



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Frontiers in Ecology and the Environment

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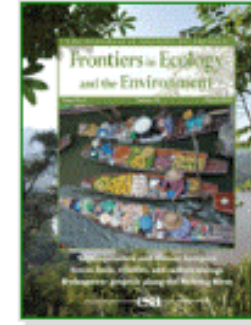
Review

Live plant imports: the major pathway for forest insect and pathogen invasions of the US

Andrew M Liebhold [✉](#), Eckehard G Brockerhoff, Lynn J Garrett,

Jennifer L Parke, Kerry O Britton

First published: 5 March 2012 [Full publication history](#)



[View issue TOC](#)
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Horticultural
plants &
forest
seedlings

Liebhold, A. M., Brockerhoff, E. G., Garrett, L. J., Parke, J. L., & Britton, K. O. 2012. Live plant imports: the major pathway for forest insect and pathogen invasions of the US. *Frontiers in Ecology and the Environment*. 10(3):135-143.

Phytophthora alni



New hybrid species

Alder
Phytophthora

SUDDEN OAK DEATH

Knocks 'em dead at

The Distillery

opening bands TBA

Thursday, May 13, 10 PM

21+, \$4.00, 2107 L St., Sacramento



SUDDEN OAK DEATH BASTOGNE & THE BREAKING POINT

Stop the spread of sudden oak death

THIS AREA IS UNDER QUARANTINE!

**This property is not
yet infected.**

Help us keep this land
disease-free.

The pathogen's spores may
spread in water, soil, and
infected plant materials.

**For more information
contact:**

You are in a quarantine area for the pathogen *Phytophthora ramorum* that causes sudden oak death in tan oaks in Oregon. This pathogen also infects other trees and shrubs in the area including rhododendron, evergreen huckleberry, and Oregon myrtle. Leaves and branches of redwood are also susceptible. These are the most common host plants in Oregon, although other plants can be infected.

You can help...

by following these steps:

- Do not import host plants from infected areas.

SUDDEN OAK DEATH



Sudden oak death, *Phytophthora ramorum* (Oregon)

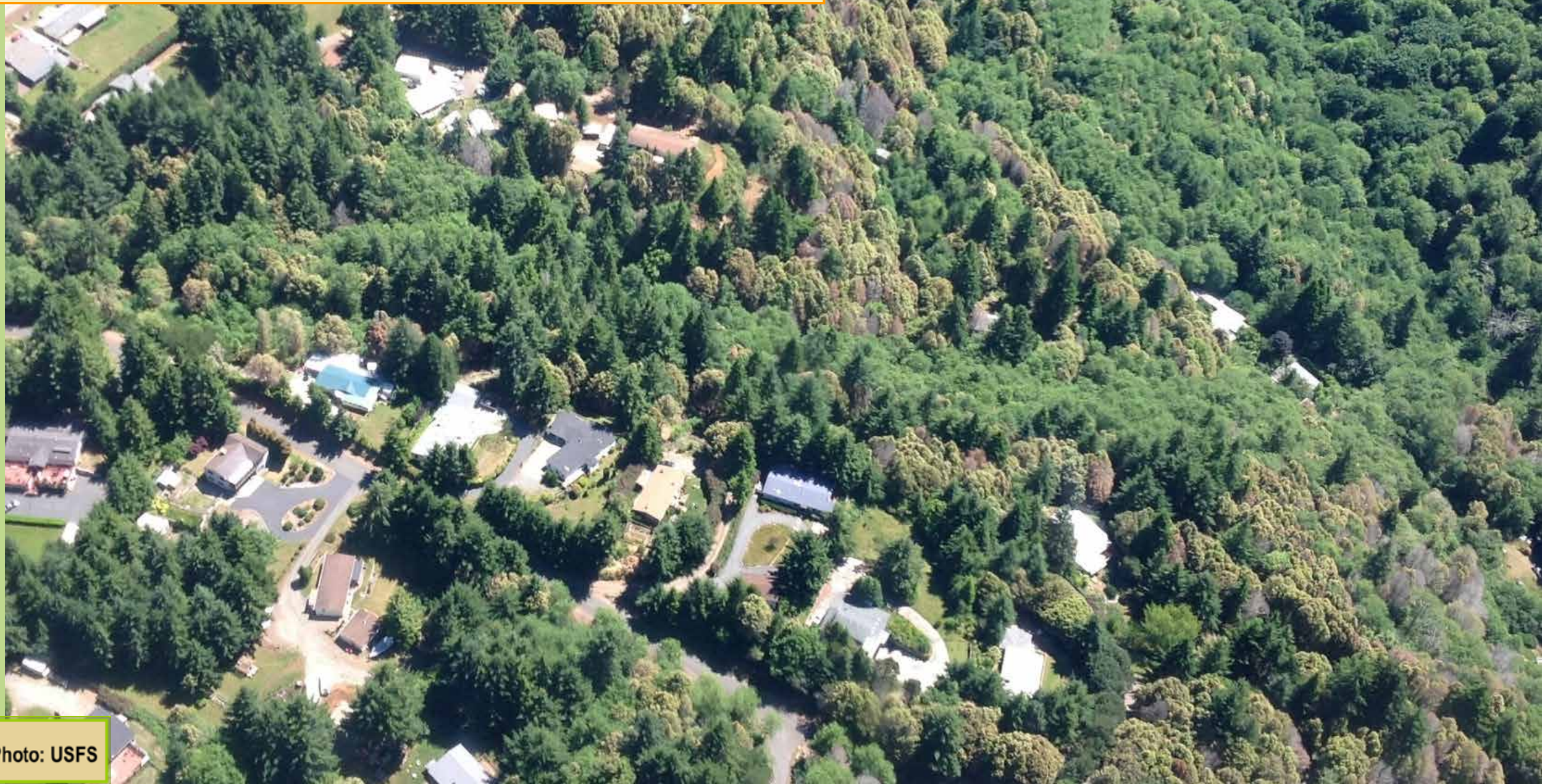
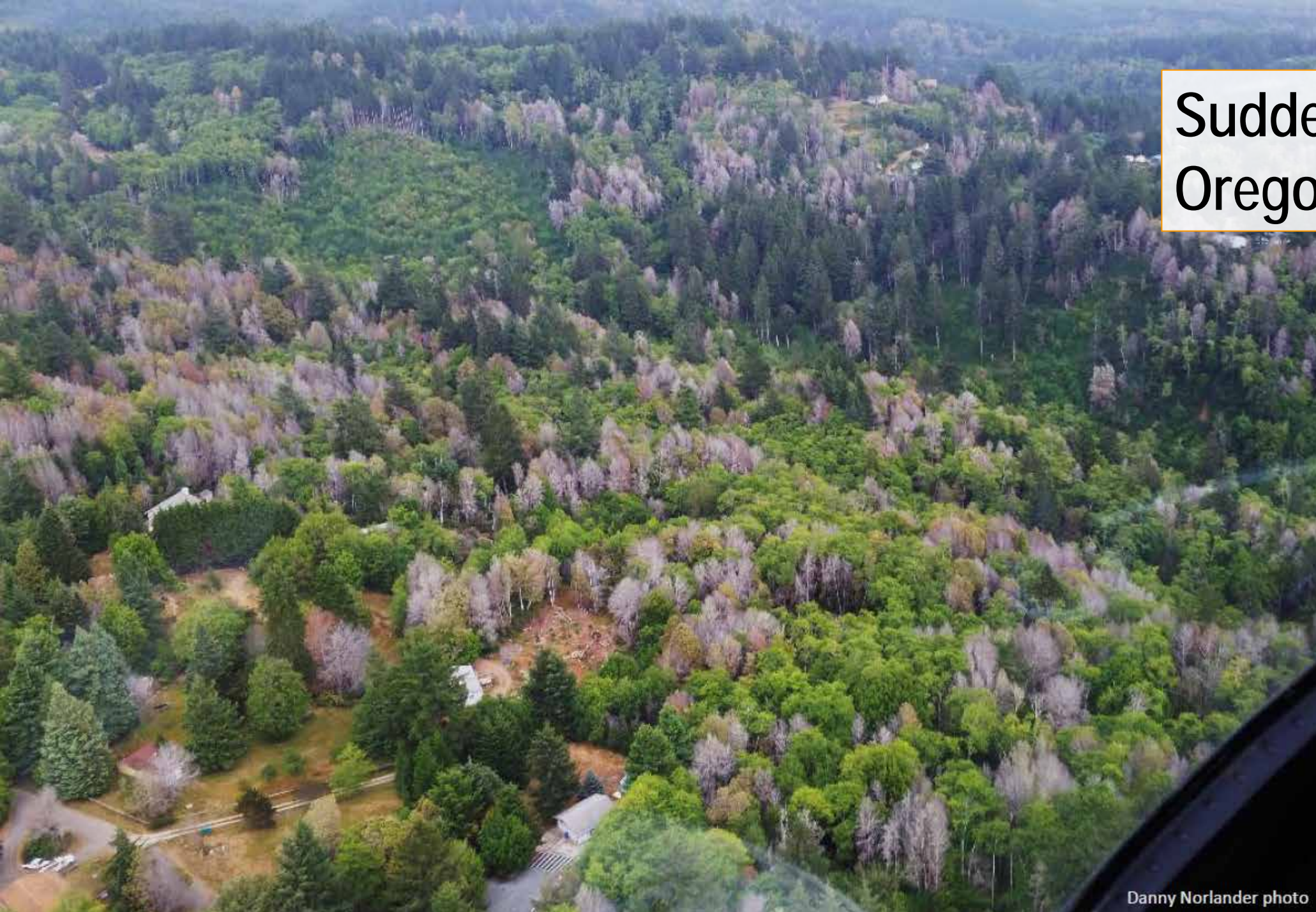


Photo: USFS

Sudden oak death, Oregon



Danny Norlander photo



**SAVE
OUR
KAURI
FORESTS**

They are
dying of kauri
dieback disease.

It spreads
by soil
movement.

ACT NOW
to help stop it.

ALWAYS



**CLEAN
YOUR
GEAR**




**STAY ON
THE
TRACK**



KEEP KAURI STANDING

STOP KAURI DIEBACK DISEASE SPREADING **KIA TOITU HE KAURI**



**THE KAURI
PROJECT**

KAURI KI UTA, KAURI KI TAI!

Kauri dieback, *Phytophthora agathidicida* in New Zealand



THE LEGS OF TANE MAHUTA WHO PUSHED HIS PARENTS RANGINUI (THE SKY FATHER) AND PAPATUANUKU (THE EARTH MOTHER) APART TO BRING LIGHT TO THE WORLD...

KAURI

FOUND ONLY
IN THE NORTH
ISLAND OF NZ

THESE FOREST
GIANTS
LIVE FOR UP TO
2000 YEARS
MAKING THEM ONE OF
THE LONGEST LIVING
NATURAL SPECIES
ON EARTH..

**NOW THEY
ARE UNDER
THREAT FROM
KAURI
DIEBACK
DISEASE**

11%
OF OUR TREES
ARE INFECTED

INCLUDING MANY IN
OUR BACKYARD - THE
WAITAKERE RANGES

BTHELLS

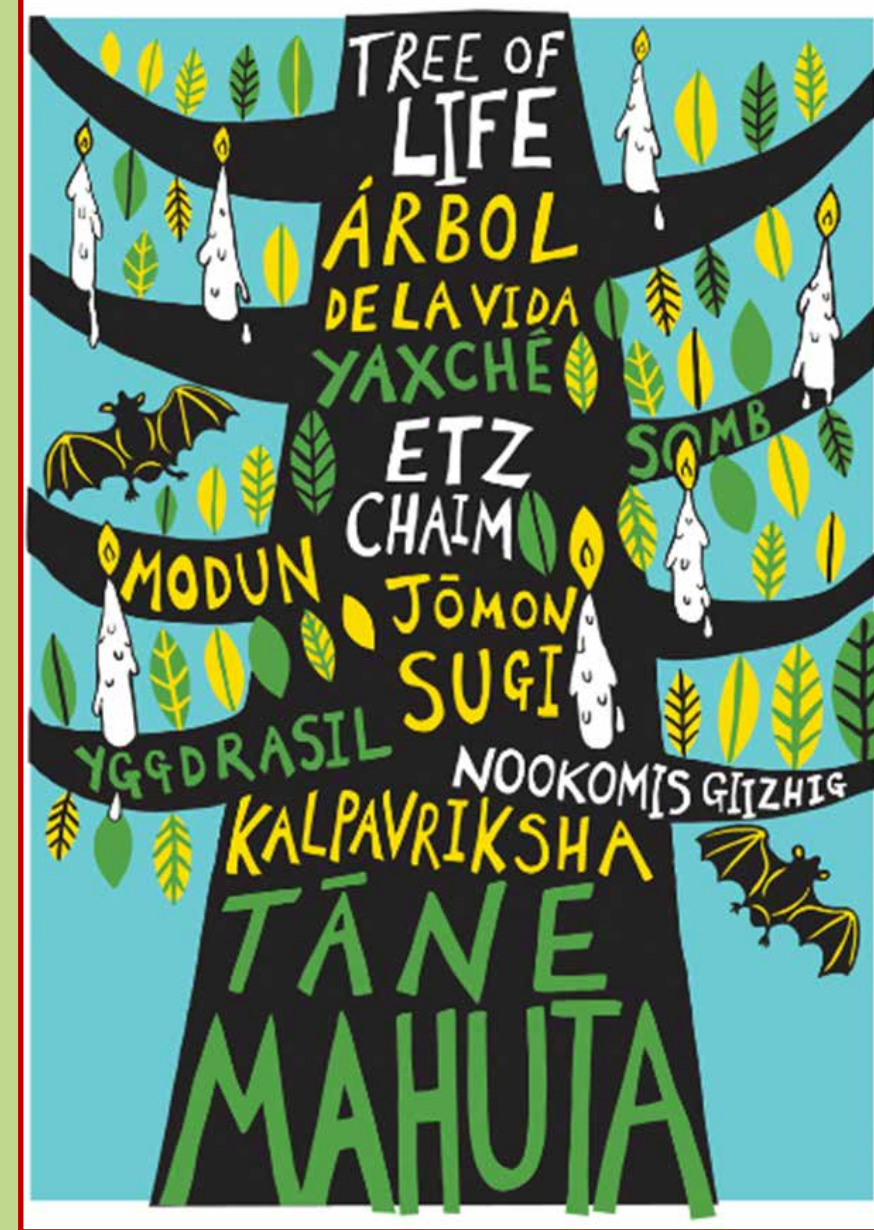
PIHA

STOP THE SPREAD!

KEEP TO THE TRACK AND MAKE
SURE YOUR DOGS DO TOO

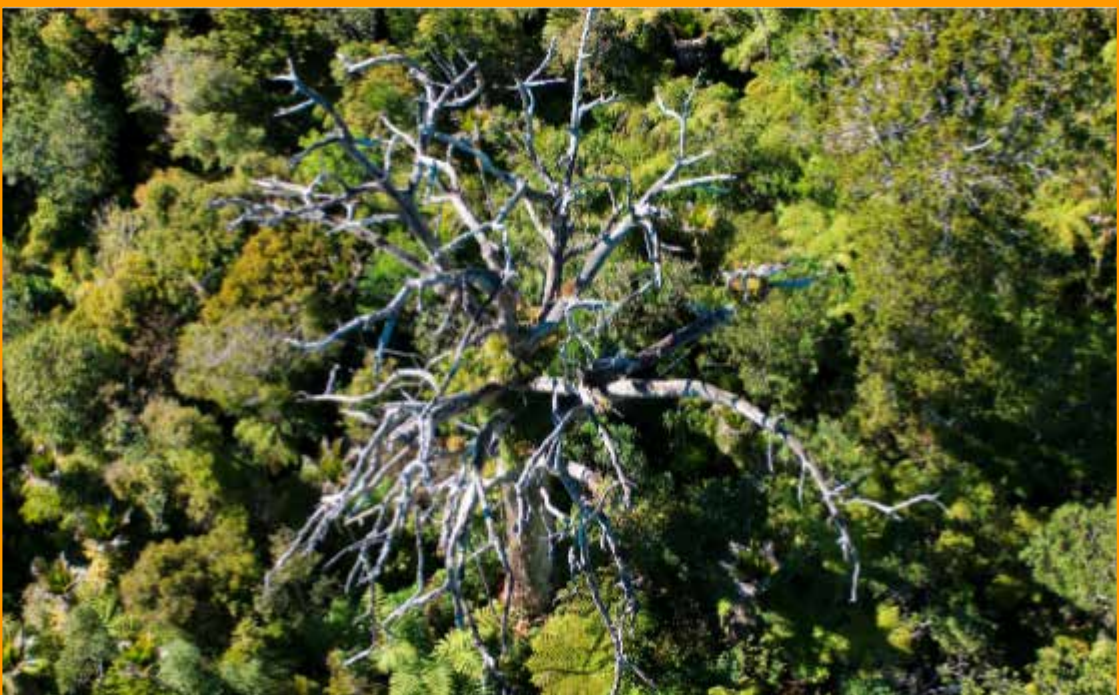
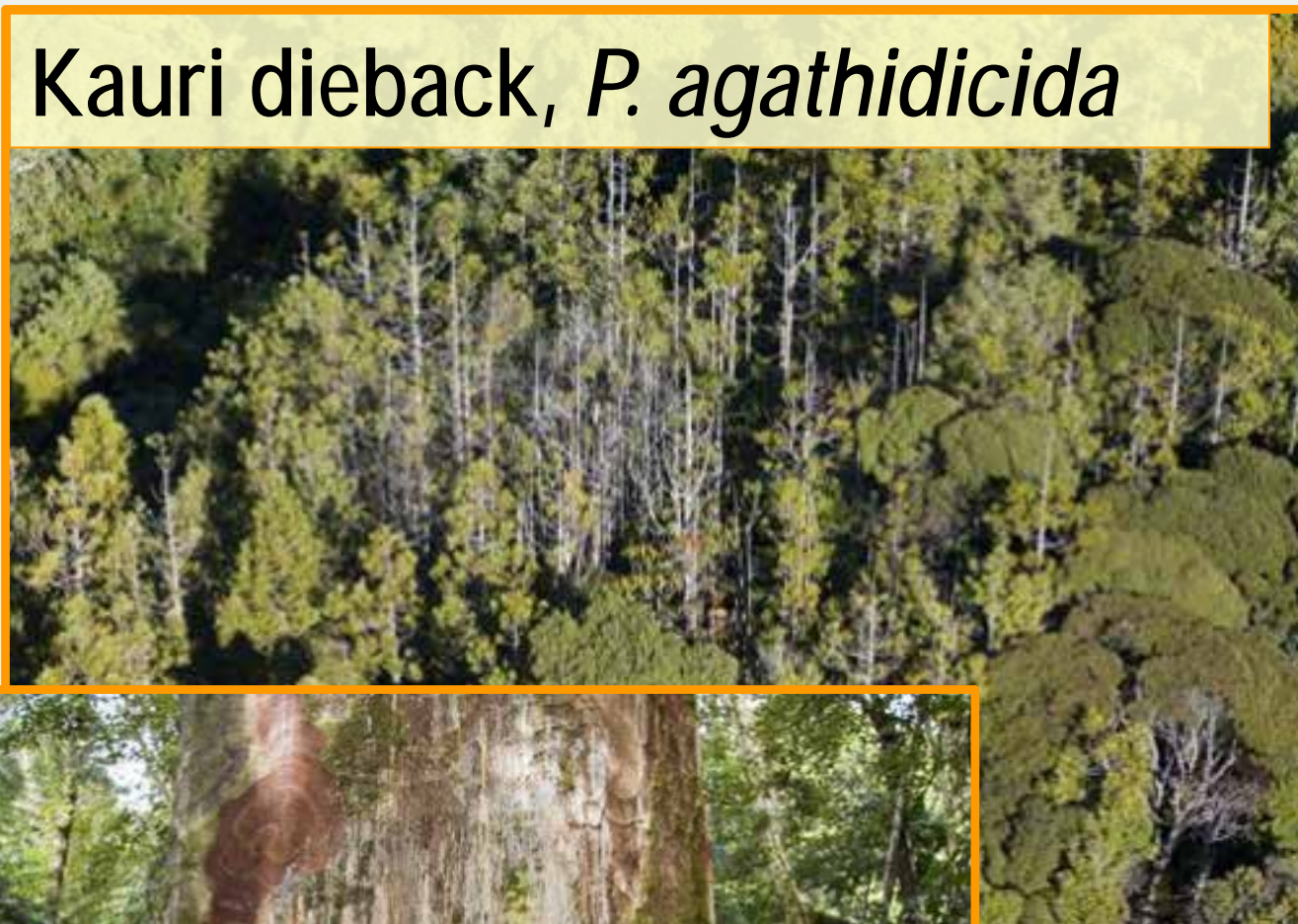
DISINFECT YOUR SHOES AND
GEAR BEFORE AND AFTER
HIKES AT STATIONS PROVIDED

INFOGRAPHIC BROUGHT TO YOU BY THE WAITAKERE FESTIVAL
WWW.WAITAKEREFESTIVAL.COM

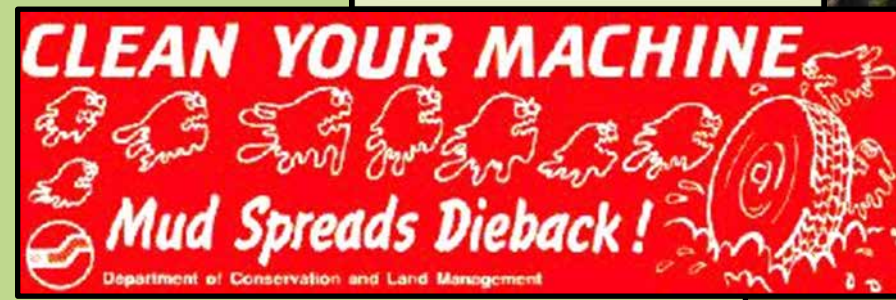
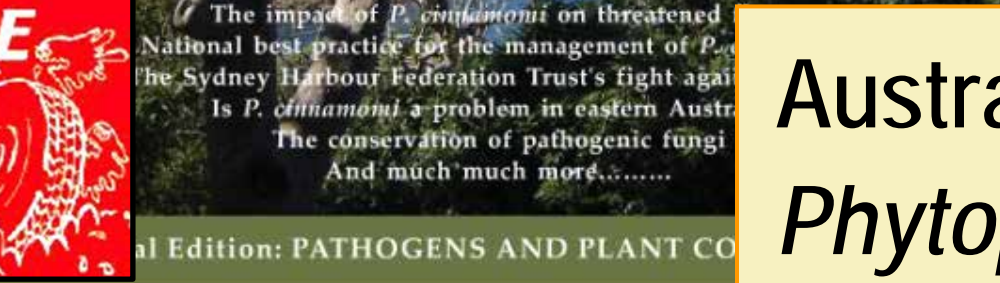


<http://www.kauridieback.co.nz>

Kauri dieback, *P. agathidicida*



Kauri
dieback,
NZ



Australia, Jarrah Dieback,
Phytophthora cinnamomi

Phytophthora cinnamomi, Australia



Phytophthora cinnamomi
The Biological Bulldozer

Phytophthora in South Africa

FYNBOS BIOME

70%

OF THE PLANT SPECIES IN THE
CAPE FLORISTIC REGION



THE CAPE FLORISTIC REGION
(<6% OF THE TOTAL LAND AREA IN SOUTH AFRICA)

CONTAINS NEARLY $\frac{1}{2}$ OF
ALL VASCULAR PLANT
SPECIES IN SA

**65% OF SPECIES
ARE ENDEMIC**



**1700 SPECIES ARE
THREATENED**

PRODUCED BY
**CAPE
CITIZEN
SCIENCE**



Photo: Hulbert, Univ. of Pretoria

**BECOME A
PATHOGEN
HUNTER**



GO OUTDOORS FOR SCIENCE
REPORT DYING PLANTS

Cape Citizen Science

Phase one

**REPORT A DYING PLANT IN
THE FYNBOS**

Joel Hulbert, South Africa

PLANT DESTROYERS

PHYTOPHTHORA

(FY TOFF THOR UH)

PHYTO = PLANT
PHTHORA = DESTROYER

PHYTOPHTHORA ARE
MICROSCOPIC ORGANISMS
THAT KILL PLANTS.

COMMONLY REFERRED TO AS
'WATER MOLDS'
BECAUSE THEY PRODUCE
SWIMMING SPORES.

MICROSCOPIC STRUCTURES



MAJOR DISEASES

SUDDEN OAK DEATH
PHYTOPHTHORA RAMORUM
USA

MILLIONS OF OAK TREES HAVE
DIED BECAUSE OF THIS DISEASE.



USDA FPM-415

Port Orford Root Disease, *Phytophthora lateralis*



Oregon & Northern CA

Photo: Goheen, USFS

Publications and new discoveries in 2015 to date

13,200 papers - 2015 to 2017



P. austrocedrae,
on juniper in Scotland



P. nicotianae on *Acacia* in
Brazil



European beech,
Germany,
P. cambivora

Widespread *Phytophthora* infestations in European nurseries put forest, semi-natural and horticultural ecosystems at high risk of *Phytophthora* diseases

T. Jung^{1,2,38}, L. Orlikowski³, B. Henricot⁴, P. Abad-Campos⁵, A. G. Aday⁶, O. Aguin Casal⁷, J. Bakonyi⁸, S. O. Cacciola⁹, T. Cech¹⁰, D. Chavarriaga¹¹, T. Corcobado¹², A. Cravador¹, T. Decourcelle¹³, G. Denton⁵, S. Diamandis¹⁴, H. T. Doğmuş-Lehtijärvi⁷, A. Franceschini¹⁵, B. Ginetti¹⁶, M. Glavendekić¹⁷, J. Hantula¹⁸, G. Hartmann¹⁹, M. Herrero²⁰, D. Ivic²¹, M. Horta Jung¹, A. Lilja¹⁸, N. Keca¹⁷, V. Kramarets²², A. Lyubenova²³, H. Machado²⁴, G. Magnano di San Lio⁹, P. J. Mansilla Vázquez⁷, B. Marçais²⁵, I. Matsiakh²², I. Milenkovic¹⁷, S. Moricca¹⁶, Z. Á. Nagy⁸, J. Nechwatal²⁶, C. Olsson²⁷, T. Oszako²⁸, A. Pane⁹, E. J. Paplomatas²⁹, C. Pintos Varela⁷, S. Prospero³⁰, C. Rial Martínez⁷, D. Rigling³⁰, C. Robin¹³, A. Rytönen¹⁸, M. E. Sánchez³¹, B. Scanu¹⁵, A. Schlenzig³², J. Schumacher³³, S. Slavov²³, A. Solla¹², E. Sousa²⁴, J. Stenlid²⁷, V. Talgø²⁰, Z. Tomic²¹, P. Tsopelas³⁴, A. Vannini³⁵, A. M. Vettraino³⁵, M. Wenneker³⁶, S. Woodward¹¹ and A. Pérez-Sierra³⁷

Jung, T., Orlikowski, L., Henricot, B., Abad-Campos, P., Aday, A. G., Aguin Casal, O., ... & Corcobado, T. 2015. Widespread *Phytophthora* infestations in European nurseries put forest, semi-natural and horticultural ecosystems at high risk of *Phytophthora* diseases. Forest Pathology. doi: 10.1111/efp.12239 (October 1, 2015).

DISEASE NOTES

First Report of *Phytophthora pluvialis* Causing Needle Loss and Shoot Dieback on Douglas-fir in Oregon and New Zealand

E. M. Hansen, P. Reeser, and W. Sutton, Department of Botany and Plant Pathology, Oregon State University, Corvallis 97331; and **J. Gardner and N. Williams**, New Zealand Forest Research Institute (Scion), Private Bag 3020, Rotorua 3046, New Zealand.



Oregon



New Zealand, *P. radiata*



First report of the EU1 clonal lineage of *P. ramorum* on tanoak in an Oregon forest

SUDDEN OAK DEATH
PISTOL RIVER AREA
16 JULY 2015

EU1 lineage
Cut and piled

14567

All NA1 lineage
Untreated

14709

14710

14707

14706

Approximate location
of closed nursery

ODF maps

● INFECTED TREE, 2015

P. cinnamomi

plant disease

Editor-in-Chief: Alison E. Robertson
Published by The American Phytopathological Society

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<http://dx.doi.org/10.1094/PDIS-03-16-0408-FE>

FEATURE

Endemic and Emerging Pathogens Threatening Cork Oak Trees: Management Options for Conserving a Unique Forest Ecosystem

Moricca, S., Linaldeddu, B. T., Ginetti, B., Scanu, B.,
Franceschini, A., & Ragazzi, A. 2016. Endemic and Emerging
Pathogens Threatening Cork Oak Trees: Management Options for
Conserving a Unique Forest Ecosystem. *Plant Disease*. 100(11):
2184-2193.



RESEARCH ARTICLE

Diversity of *Phytophthora* Species from Declining Mediterranean Maquis Vegetation, including Two New Species, *Phytophthora crassamura* and *P. ornamentata* sp. nov.

Bruno Scanu^{1*}, Benedetto T. Linaldeddu¹, Antonio Deidda¹, Thomas Jung^{2,3}



CrossMark

1 Dipartimento di Agraria, Sezione di Patologia vegetale ed Entomologia (SPaVE), Università degli Studi di Sassari, Viale Italia 39, 07100 Sassari, Italy, **2** Phytophthora Research and Consultancy, Am Rain 9, D-83131, Nußdorf, Germany, **3** Center for Mediterranean Bioresources and Food (MeditBio), Laboratory of Molecular Biotechnology and Phytopathology, University of Algarve, Campus de Gambelas, 8005–139 Faro, Portugal

B. Scanu and others. 2015. Diversity of *Phytophthora* Species from Declining Mediterranean Maquis Vegetation, including Two New Species, *Phytophthora crassamura* and *P. ornamentata* sp. nov. PLoS ONE. 10(12):e0143234.

Quercus ilex
decline
evergreen oak,
holly oak, or
holm oak
in Italy



B. Scanu and others. 2015. Diversity of *Phytophthora* Species from Declining Mediterranean Maquis Vegetation, including Two New Species, *Phytophthora crassamura* and *P. ornamentata* sp. nov. PLoS ONE. 10(12):e0143234.

In summary....

- 1) *Phytophthora* pathogens continue to cause tree and plant decline throughout the world and are particularly damaging in Mediterranean climates.
- 2) Prevention is key. Once pathogens are introduced to forests they cannot be eradicated.
- 3) Clean stock is imperative particularly for sensitive habitats.



Acknowledgements

USDA Forest Service, Pacific Southwest Research Station

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- www.suddenoakdeath.org

- www.calphytos.org

