CALIFORNIA OAK MORTALITY TASK FORCE REPORT
AUGUST 2021

MONITORING AND MANAGEMENT - OREGON

The *Phytophthora ramorum* NA2 wildland infestation in Oregon is larger than initially realized. Oregon Department of Forestry (ODF), U.S. Forest Service, and Oregon State University sudden oak death (SOD) crews have conducted intensive ground surveys in the Port Orford area to determine the extent of the NA2 lineage infestation. Since late May over 136 *Phytophthora ramorum* positive samples have been collected from tanoaks and rhododendrons surrounding the initial two tanoak trees along Highway 101 (Figures 1 & 2). Additional survey work has been completed by ODF staff including two additional stream baits and a helicopter survey. Given the significance of this infestation, a 600 ft treatment buffer has been set around all infected trees resulting in a 475 acre treatment area.

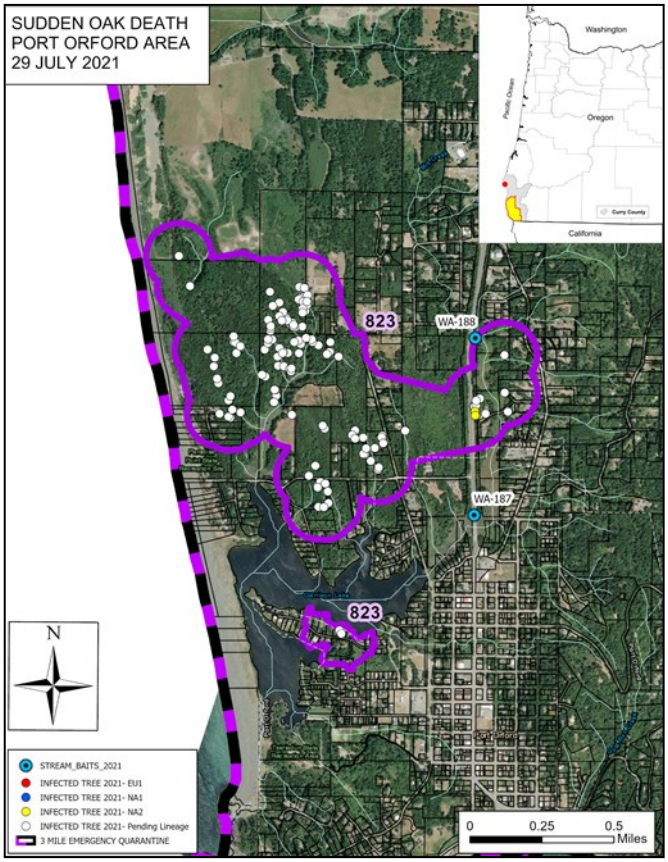

Figure 1. Map of the delimited area of the NA2 *Phytophthora ramorum* wildland infestation near Port Orford, Oregon. Figure 2. Charlie Grell, U.S. Forest Service SOD Forester, sampling a symptomatic tanoak.

The Oregon Legislature has allocated $1.7 million for detection and treatment of sudden oak death over the next two years with a further $190,000 coming in 2021 from the U.S. Forest Service under a cooperative agreement. Treating this area is estimated to cost about $1.7 million. Oregon State University Forestry and Natural Resources Extension in Coos and Curry Counties plan to provide information sessions about the disease to the public this summer in Port Orford.

The programs will train local residents to identify symptoms of sudden oak death so they can report concerns on their properties. They have developed a website specifically for local residents. A new factsheet for this NA2 *P. ramorum* wildland infestation and press release are also available from ODF. For more information contact Sarah Navarro at Sarah.Navarro@usda.gov.

NURSERIES AND MANAGED LANDSCAPES

USDA APHIS 2021 mid-year *Phytophthora ramorum* program update. USDA APHIS and APHIS accredited laboratories have confirmed 128 positive samples for *P. ramorum* in various establishments (regulatory incidents) thus far in 2021. Rhododendron plants continue to be the most commonly detected infected genus, comprising 61.7% of the positive samples confirmed so far this year. The next most common genera to test positive were *Pieris* and *Loropetalum*, with 13.3% and 9.4% respectively (see Table 1 and Figure 1).

Table 1. Number and percentage of samples collected from nurseries and other establishments that were confirmed positive for *P. ramorum* by APHIS and APHIS accredited laboratories from January 1 through July 19, 2021.

Sample type	# Samples	Percent
Arbutus	2	1.6
Camellia	5	3.9
Gaultheria	1	0.8
Leucothoe	1	0.8
Loropetalum	12	9.4
Pieris	17	13.3
Rhododendron	79	61.7
Soil Sample	7	5.5
Water (Bait) Sample	4	3.1
Grand Total	**128**	100.00

For more details see the full report or contact Betsy Randall-Schadel, betsy.randall-schadel@usda.gov.

California Department of Food and Agriculture (CDFA) *P. ramorum* program update. Over the past few months, two trace investigations have been conducted in California. The investigations have been completed with no positive plant detections. For more information contact Carolyn Lambert at Carolyn.Lambert@cdfa.ca.gov.

Washington State Department of Agriculture (WSDA) *P. ramorum* program update. In May, USDA APHIS and WSDA staff performed a certification survey at a wholesale shipping nursery under compliance. During the two-day survey, 413 samples were collected. All samples tested negative for *P. ramorum*.

In June, WSDA conducted a trace-forward investigation on plants shipped from a positive out-of-state nursery. Eight receiving locations in Washington were inspected. One sample was

collected that tested negative for *P. ramorum*. All other inspected host plants were in good condition or had been sold. For more information contact Scott Brooks at SBrooks@agr.wa.gov.

REGULATIONS

The California Department of Forestry and Fire Protection (Cal Fire) and California Department of Food and Agriculture (CDFA) have entered into an agreement to allow Cal Fire Forest Health Specialists to be considered "official" *P. ramorum* samplers. Diagnostic results for materials collected by official samplers are recognized by the State and USDA APHIS as data to inform regulations (quarantines). Without such an agreement, “official samplers” are limited to employees of agricultural regulatory agencies. All samples must be submitted and tested by a laboratory approved by APHIS, using methods approved by APHIS. For more information contact Chris Lee, christopher.lee@fire.ca.gov.

RESEARCH (EXCERPTS OR ABBREVIATED ABSTRACTS)

Hieno, A.; Li, M.; Otsubo, K.; Suga, H. and Kageyama, K. 2021. Multiplex LAMP detection of the genus *Phytophthora* and four *Phytophthora* species *P. ramorum*, *P. lateralis*, *P. kernoviae*, and *P. nicotianae*, with a plant internal control. Microbes and Environments. 36(2): ME21019. https://doi.org/10.1264/jsme2.ME21019.

Phytophthora species cause destructive plant diseases worldwide. All *Phytophthora* species, except for one, are listed as plant quarantine organisms in Japan. The exception, *Phytophthora nicotianae,* is considered to be a domestic species. The injurious pests *Phytophthora ramorum*, *Phytophthora lateralis*, and *Phytophthora kernoviae* are invasive pathogens that cause tree mortality worldwide, mainly in the United States and the United Kingdom. To effectively control *Phytophthora* diseases, we established detection methods that utilize the loop-mediated isothermal amplification (LAMP) of the genus *Phytophthora* and the four species *P. ramorum*, *P. lateralis*, *P. kernoviae*, and *P. nicotianae*. LAMP primers for *P. ramorum*, *P. lateralis*, and *P. kernoviae* were newly designed in the present study. Our multiplex assay includes the detection of plant DNA as an internal control. When the optimum ratio between plant and pathogen primers was used in multiplex LAMP assays, 1 pg to 100 fg of pathogen DNA was detected with similar sensitivity to that in simplex LAMP assays. The detection of plant DNA in the absence of pathogens enables us to check for and avoid undesirable negative results caused by enzyme inactivation or the contamination of amplification inhibitors from plant tissues. The total time from sample collection to results is approximately 120 min, and, thus, our multiplex LAMP assay may be used as an accurate and time-saving detection method for *Phytophthora* pathogens.

Taylor, C.R. and Grünwald, N.J. 2021. Growth, infection and aggressiveness of *Phytophthora* pathogens on *Rhododendron* leaves. CABI Agriculture and Bioscience. 2(1): 1-15.

Background. *Phytophthora* species are well known as important or emerging pathogens. The genus *Rhododendron* is of considerable importance to plant regulatory agencies because it is host to many *Phytophthora* species, most notably, *P. ramorum* and *P. kernoviae.* Few studies have directly contrasted the epidemiology of different *Phytophthora* spp. on a given host.

Methods. We investigated aspects of the foliar epidemiology (lesion size, sporulation and temperature responses) of *P. cactorum*, *P. cambivora*, *P. cinnamomi*, *P. citrophthora*, *P.*

foliorum, *P. kernoviae*, *P. lateralis*, *P. nemorosa*, *P. nicotianae*, *P. plurivora*, *P. ramorum* and *P. syringae* on *Rhododendron* in detached leaf, whole plant chamber, and field studies.

Results. *P. syringae* stood out as it appeared to be a relatively weak pathogen, showing no sporulation and low levels of disease severity, except at low temperatures. *P. nicotianae* was consistently able to grow at higher temperatures than any of the other *Phytophthora* spp. and showed higher aggressiveness than any of the other species at high temperatures. *P. cinnamomi* and *P. cactorum*, typically thought of as root-infecting species, were able to cause as much foliar disease as *P. syringae*, a foliar pathogen. *P. kernoviae* was consistently among the most aggressive species with the highest sporulation.

Conclusion. These results provide novel insights into the comparative epidemiology of these important established and emerging *Phytophthora* species.

RELATED RESEARCH

Jones, C.M.; Jones, S.; Petrasova, A.; Petras, V.; Gaydos, D.; Skrip, M.M.; Takeuchi, Y.; Bigsby, K. and Meentemeyer, R.K. 2021. Iteratively forecasting biological invasions with PoPS and a little help from our friends. Frontiers in Ecology and the Environment. https://doi.org/10.1002/fee.2357.

O'Hanlon, R.; Destefanis, M.; Milenković, I.; Tomšovský, M.; Janoušek, J.; Bellgard, S.E.; Weir, B.S.; Kudláček, T.; Horta Jung, M. and Jung, T. 2021. Two new *Nothophytophthora* species from streams in Ireland and Northern Ireland: *Nothophytophthora irlandica* and *N. lirii* sp. nov. Plos one. 16(5): e0250527.

Swiecki, T.J.; Bernhardt, E.A.; Frankel, S.J.; Benner, D. and Hillman, J. 2021. An accreditation program to produce native plant nursery stock free of *Phytophthora* for use in habitat restoration. Plant Health Progress. (First Look). https://doi.org/10.1094/PHP-02-21-0025-FI.

Van Poucke, K.; Haegeman, A.; Goedefroit, T.; Focquet, F.; Leus, L.; Jung, M.H.; Nave, C.; Redondo, M.A.; Husson, C.; Kostov, K. and Lyubenova, A. 2021. Unravelling hybridization in *Phytophthora* using phylogenomics and genome size estimation. IMA fungus. 12(1): 1-24.

RESOURCES

An updated map of the distribution of *P. ramorum* in California and Southern Oregon wildlands based on CALINVASIVES entries is now available. CALINVASIVES has also assembled a *P. ramorum* factsheet. CALINVASIVES is led by Matteo Garbelotto, UC Berkeley, Forest Pathology and Mycology laboratory.

Scanu, B. and Jung, T. eds. 2021. *Phytophthora* Infestations in Forest Ecosystems. doi: 10.3390/books978-3-0365-0801-6.
10 papers, 216 pages. https://www.mdpi.com/journal/forests/special_issues/Phytophthora
(Available in print ISBN 978-3-0365-0800-9 (Hbk); or digital format ISBN 978-3-0365-0801-6 (PDF).

KUDOS

Congratulations, thanks and best wishes to Karen Suslow upon her retirement from the National Ornamental Research Site at Dominican University (NORSDUC). Karen has worked on addressing *P. ramorum* for over 20 years and served for decades on the California Oak Mortality Task Force Executive Committee. She is a leader in California horticulture having served as production manager and general manager at Hines Nurseries, Winters, CA, for a total of 18 years, followed by 9 years as leader of NORSDUC.

MEETINGS

The 2021 annual meetings of the California Oak Mortality Task Force & Phytophthoras in Native Habitats Work Group will be held online September 21 – 23, starting at 1 pm PDT each day. On September 21, presentations will include updates on the NA2 sudden oak death infestation in Oregon, Bay Area Tree Mortality, and other current forest health concerns. On September 22, the California Oak Mortality Task Force will convene for round robin and discussion. On September 23, the Phytophthoras in Native Habitats Work Group will feature short talks on the theme of managing Phytophthoras in open space areas and nurseries. Registration is free but advanced registration is required (Go to online registration HERE). For more information, jalexander@ucanr.edu.