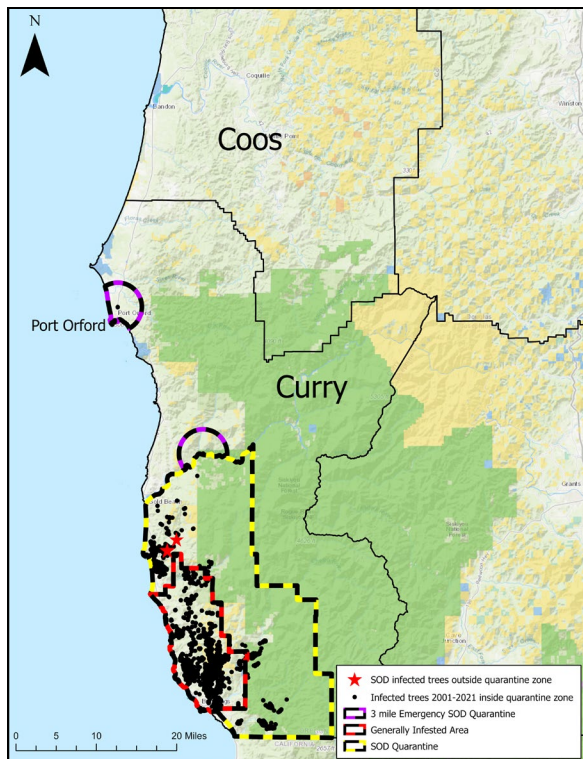




## CALIFORNIA OAK MORTALITY TASK FORCE REPORT JUNE 2021

### MONITORING AND MANAGEMENT - OREGON

***Phytophthora ramorum* NA2 lineage has been detected infecting trees growing more than 20 miles north of the Oregon sudden oak death (SOD) quarantine area.** Two infestations of *P. ramorum* have been found outside the SOD quarantine area in Oregon. The first is on national forest land on the north bank of the Rogue River, six miles north of any previously known infestation. The second is just outside Port Orford, 21 miles northwest of the Rogue River and 13 miles south of the Coos County border (Figure 1). The first site has been treated and is ready for burning. Treatment is planned at the second site after confirmatory tests.



**Figure 1. Map showing locations of recent *P. ramorum* detections in Oregon and emergency SOD quarantine areas.**  
Credit: USFS PNW Region, FHP.

On March 22, 2021 the Forest Pathology Lab at Oregon State University (OSU) confirmed the presence of *P. ramorum* in the Rogue River-Siskiyou National Forest in the Myrtle Tree Trail area, which is just north of the 515-square-mile SOD quarantine area. The samples had been collected March 9th by an Oregon Department of Forestry (ODF) SOD Forester. The trees were identified by aerial imagery interpretation (due to COVID) as a part of the annual U.S. Forest Service/ODF Aerial Detection Survey. OSU cultured the pathogen and extracted DNA from the samples, which turned out to belong to the EU1 lineage of *P. ramorum*.

Per established federal protocols for verifying a positive *P. ramorum* test, the DNA was then given to the Oregon Department of Agriculture (ODA). That agency's Plant Health Lab in Salem confirmed the positive results on April 16th. Samples were shipped April 19th to the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) Lab in Maryland for final confirmation. ODF and U.S. Forest Service SOD crews marked off an area 1,000 ft from the sampled trees and looked for more trees showing symptoms of the disease. In total, to date, five tanoak (*Notholithocarpus densiflorus*) trees have been identified as showing symptoms of *P. ramorum* following surveys in the area (two are awaiting final lab confirmation). Local U.S. Forest Service staff were granted emergency approval under the National Environmental Protection Act (NEPA) to treat for SOD eradication. The treatment buffer is set at 600 ft. Cutting and piling of all tanoaks at the site was completed May 13th, with burning to be carried out when conditions are suitable.



A second site in Curry County, just outside Port Orford, was found on April 27th along Highway 101 in an Oregon Department of Transportation right-of-way. This site is 21 miles northwest of the site by the Rogue River, and about 13 miles south of Coos County. Samples collected there, by an OSU researcher who noticed dying tanoaks by the side of the road, have tested positive at OSU for the NA2 lineage of *P. ramorum*. Previously found only in nurseries, this is the first time this lineage has been found infecting vegetation in wildlands. Per federal protocols, confirmatory tests at the ODA and USDA labs will follow. For this site, SOD crews are reaching out to adjacent landowners to survey a 900 ft area around the infected trees. ODF will fly a targeted helicopter survey in the coming weeks to help direct ground survey work. Once the area is delimited, a treatment buffer will be set.

ODA SOD regulations allow any property in the state, including a buffer zone of up to 3 miles surrounding where a SOD infestation has been confirmed, to be placed under quarantine (OAR 603-052-1230(2)(d)). Oregon's SOD Program will consult with stakeholders regarding any potential expansion of quarantine boundaries in light of the newly discovered sites. For more information contact Sarah Navarro at Sarah.Navarro@usda.gov.

## REGULATIONS

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Del Norte County has been added to the *P. ramorum* quarantine area by the USDA Animal and Plant Health Inspection Service (APHIS), bringing the number of known wildland-infested, quarantine California counties to 16. This action is in response to the confirmation of *P. ramorum* in Del Norte County on tanoak on September 19, 2020 (see [COMTF News, December 2020](#)). The California Department of Food and Agriculture has established an intrastate quarantine for Del Norte County in harmony with the federal regulatory requirements as specified in 7 CFR 301.92. More information on APHIS *P. ramorum* regulations may be found at <http://www.aphis.usda.gov/plant-health/sod> or contact National Policy Manager, William Wesela at [william.d.wesela@usda.gov](mailto:william.d.wesela@usda.gov).

## NURSERIES

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**California Department of Food and Agriculture (CDFA) *P. ramorum* Program update.** Spring 2021 compliance inspections at previously positive nurseries in California have been completed: nine nurseries were inspected for *P. ramorum* and sampled. Two of the nurseries sampled had positive plants detected during these spring inspections; at a third, nursery positive plants were found during a follow-up delimitation inspection triggered by a detection of positive plants in 2020. This brings the total number of known positive nurseries in California to three. The *P. ramorum* positive plant genera detected in 2021 are *Loropetalum*, *Rhododendron*, and *Camellia*. The nurseries are undergoing the USDA Official Regulatory Protocol for Nurseries Containing Plants Infected with *Phytophthora ramorum*. Trace investigations for two of the nurseries are ongoing. The trace investigation for the third positive nursery yielded no additional positive plants. For more information contact Carolyn Lambert, CDFA at [Carolyn.Lambert@cdfa.ca.gov](mailto:Carolyn.Lambert@cdfa.ca.gov).

**Oregon Department of Agriculture (ODA) *P. ramorum* Nursery Program update.**

Compliance surveys for the 2021 spring season began on March 1<sup>st</sup> with eleven nursery inspections. Of the eight interstate shipping nurseries that were inspected, three nurseries were confirmed positive for *P. ramorum*.

At Nursery A (Columbia County), 335 foliar samples were collected and 28 were confirmed positive by ODA; 15 tested inclusive and were sent to USDA for final confirmation. USDA confirmed an additional nine positives, five negatives, and one inconclusive sample. Trace back investigations have been completed with no additional positives found. Trace forward investigations are ongoing. Shipments were sent to big box stores in 36 other states. ODA confirmed that none of the material shipped came from the blocks where confirmed positive plants were located. Confirmed cultivars included: *Gaultheria procumbens*; *Rhododendron* 'Yaku Prince', 'Kalinka', 'Jean Marie'; *Pieris* 'Mountain Fire', 'Flaming Silver', 'Valley Rose'; Azalea 'Elsie Lee'. The *G. procumbens* and *Rhododendron* were sourced from two growers in British Columbia, Canada. The *Pieris* spp. were sourced from an Oregon nursery. Nursery A has destroyed all plants in the confirmed positive blocks and greenhouses. The nursery fumigated the areas that were cleared of plants with Basamid® (dazomet). Soil from this location has never tested positive. Water samples collected from multiple locations in this nursery also tested negative.

At Nursery B (Marion County) 247 foliar samples were taken. Two samples were confirmed positive: *Rhododendron* 'Glowing Gold' and *Arbutus unedo*. ODA staff has returned to the facility to conduct delimitation inspections. The nursery opted to destroy plants within the quarantine and destruction zones. Trace back investigations are ongoing. No shipments were sent out of state.

At Nursery C (Marion County), of 247 foliar samples, 22 were confirmed positive. The confirmed positive cultivars include: *Rhododendron catawbiense* 'Grandiflorum'; *Rhododendron* 'Roseum Pink'; *Pieris japonica* 'Purity' and *Leucothoe* spp. Trace investigations and delimitation work are ongoing.

At the start of 2021, ODA's *P. ramorum* program included eight interstate shippers under federal compliance agreements (7 CFR 301.92; located in Polk (1), Washington (1), Marion (4), Columbia (1), and Lane (1) Counties) and two intrastate shippers, which are regulated under Oregon state quarantine and federal requirements (OAR 603-052-1230 and 7 CFR 301.92; located in Clackamas and Lincoln Counties). The 2021 spring season marked the sixth consecutive inspection with no *P. ramorum* detected at several nurseries, including two intrastate shippers (Clackamas and Lincoln Counties) and three interstate shippers (in Polk and Marion Counties). All have been formally released of state and federal program inspection requirements. For more information, please contact Chris Benemann at [sbenemann@oda.state.or.us](mailto:sbenemann@oda.state.or.us).

**Washington State Department of Agriculture (WSDA) *P. ramorum* Program update.**

In April, a two-day survey was conducted at the Kitsap County Botanical Garden first found positive for *P. ramorum* in 2015. A total of 213 samples were collected near previous positive sites and around the perimeter areas of the garden. All plant samples were negative for *P. ramorum*. USDA APHIS and WSDA are taking steps to deregulate this site. The last positive



plant sample was detected in February 2016. During the last 6 years, over 5,000 samples have been collected and 99.1% have tested negative for *P. ramorum*. The mitigation actions and best management practices implemented at the garden have been successful.

In May, WSDA samples were collected at a wholesale shipping nursery under compliance. Results from this certification survey are still pending. For more information contact Scott Brooks at [SBrooks@agr.wa.gov](mailto:SBrooks@agr.wa.gov).

### FEATURED RESEARCH

**Five new hosts for *P. ramorum* have been confirmed in Washington State: cherry laurel, Oregon grape, periwinkle, red huckleberry, and salal.** Marianne Elliott and colleagues at Washington State University, Puyallup (WSU) have conducted Koch's postulates to confirm several new *P. ramorum* hosts; their results have been published: periwinkle (*Vinca minor*) [1] and cherry laurel (*Prunus laurocerasus*) [2], or accepted for publication: salal (*Gaulthoria shallon*) [3], Oregon grape (*Berberis aquifolium* syn. *Mahonia aquifolium*) [3] and red huckleberry (*Vaccinium parvifolium*) [3]. The plants were sampled during nursery or botanic garden surveys by the Washington State Department of Agriculture between 2011-2015. Changes to the USDA APHIS "[Plants Proven to be Hosts of \*Phytophthora ramorum\*](#)" list are pending. Some of the plants will move from "associated hosts" which are only regulated on nursery stock to fully regulated species, others will be added to the list for the first time (e.g., *Vinca minor*).

*P. ramorum* symptoms on periwinkle and red huckleberry are shown below (Figure 2). These photos and others are available in the [Plant Symptoms Gallery](#) on [suddenoakdeath.org](http://suddenoakdeath.org).



**Figure 2. (L). Periwinkle leaves inoculated with *P. ramorum* showing lesions (arrows). (R) *P. ramorum* symptoms on red huckleberry. Photo credit: WSU.**

Many of these plant species are ornamentals, sold for landscaping; however, Elliott et al. (2021 [1]) note that cherry laurel and periwinkle are also invasive in U.S. forests in the urban/wildland interface, stating "Potential spread of *P. ramorum* into WA forests is of regulatory concern, as well as long distance spread to other states via nursery stock." These plant species are also commonly planted in Oregon, California and elsewhere.





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### References

1. **Elliott, M.; Rollins, L.; Bourret, T. and Chastagner, G. 2021.** First report of leaf blight caused by *Phytophthora ramorum* on periwinkle (*Vinca minor*) in Washington State, USA. Plant Disease. Early View, <https://doi.org/10.1094/PDIS-08-20-1721-PDN>.
2. **Elliott, M.; Rollins, L.; Bourret, T.; and Chastagner, G. 2020.** First report of leaf blight caused by *Phytophthora ramorum* on cherry laurel (*Prunus laurocerasus*) in Washington State, USA. Plant Disease. Early View, <https://doi.org/10.1094/PDIS-07-20-1489-PDN>.
3. **Elliott, M.; Rollins, L.; Bourret, T.; Hulbert, J.M. and Chastagner, G. In press.** Three new hosts for *Phytophthora ramorum* confirmed in Washington State: Salal, Oregon grape, and red huckleberry. Plant Health Progress.

### RESEARCH (EXCERPTS OR ABBREVIATED ABSTRACTS)

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**Bostock, R.M. and Roubtsova, T.V. 2021.** The effect of applied salinity and water stress on chemical suppression of *Phytophthora ramorum* from soilborne inoculum in *Rhododendron*. Plant Disease. Early View. <https://doi.org/10.1094/PDIS-09-20-1928-RE>.

A serious concern for nurseries is the potential for *Phytophthora ramorum* and other *Phytophthora* species to colonize roots without inducing aboveground symptoms in plants that then serve as cryptic reservoirs of inoculum. Episodic abiotic stresses that reduce plant water potential can compromise host resistance to trigger disease development from root and crown infections in many *Phytophthora*-plant interactions. We conducted a series of experiments with root-inoculated *Rhododendron* plants in a potting soil mix to assess influence of excess salt or water deficit on ramorum blight development and the potential for these abiotic stresses to affect efficacy of oomycete-suppressive chemical soil treatments. In growth chamber trials, *P. ramorum* colonized roots in both non-salted and salt-treated plants. However, salt treatment offset the benefit realized from soil treatment with mefanoxam (Subdue Maxx) or mandipropamid (Micora), as evidenced by enhanced pathogen colonization of roots. A three-week episode of water stress imposed after chemical treatment but prior to inoculation eliminated protection against *P. ramorum* root colonization conferred by fosetyl-Al (Aliette). In an outdoor experimental nursery, foliar symptoms were apparent in 23% of root-inoculated plants in two trials and absent in one trial. However, the majority of inoculated plants in all trials had colonized roots with little or no aboveground symptoms. A single application of Subdue Maxx or Aliette reduced root colonization by *P. ramorum* in *Rhododendron* plants. Although salt stress did not enhance ramorum blight symptom expression in the nursery, salt partially offset protection from *P. ramorum* root colonization obtained by Subdue Maxx.

**Ramsey, C.; Freebury, P.C.; Newman, D.H.; Schweigkofler, W.; Cseke, L.J. and Newman, S.E. 2021.** Use of foliar chemical treatments to induce disease resistance in *Rhododendrons* inoculated with *Phytophthora ramorum*. Global Journal of Agricultural Innovation, Research & Development. Volume 8:1 – 21. DOI: <https://doi.org/10.15377/2409-9813.2021.08.1>.



A field study was conducted at the National Ornamental Research Site at Dominican University California (NORS-DUC). The study goal was to evaluate three chemical inducers applied as foliar treatments for controlling *Phytophthora ramorum*, on *Rhododendron* x 'Cunningham's White' nursery plants. The inducers were chlorine dioxide (ElectroBiocide), hydrogen peroxide (OxiDate 2.0), and acibenzolar-s methyl (Actigard). Water samples from the electrostatic sprayer were measured for three physicochemical water properties. Visual assessment of plant foliage, based on the Horsfall- Barratt scale, was conducted at three and five months after chemical treatments. Foliar fluorescence (Fv/Fm) was measured over three dates. The success of *P. ramorum* inoculations were determined using qPCR methods. Visual assessment across both months showed no signs of *P. ramorum* infection or chemical injury symptoms. However, *P. ramorum* infection vis-à-vis qPCR analysis was confirmed. The September Fv/Fm results revealed that all the chemical inducer treatments were equivalent to the water treatment, except for Actigard. The qPCR results were in general agreement with the Fv/Fm results indicating that the rhododendrons were successfully inoculated with *P. ramorum* but were non-symptomatic. The electrostatic sprayer ionized the water droplets, resulting in increased Fv/Fm values for the water treatments 90 days after application. There was a three-month delay in fluorescence responses to the most effective chemical applications, indicating that woody plants may need to be monitored over the long term to determine accurate responses to foliar treatments.

#### RELATED RESEARCH

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**Dale, A.; Kus, S.; Uzunovic, B.A. 2021.** Detection of *Phytophthora* pathogens in wood products using genomics. FPInnovations. Vancouver, BC, Canada.

<https://library.fpinnovations.ca/media/WP/TR2021N27.pdf>

**Mota, I.; Teixeira-Santos, R.; Rufo, J.C. 2021.** Detection and identification of fungal species by electronic nose technology: A systematic review. Fungal Biology Reviews. Early view.

<https://doi.org/10.1016/j.fbr.2021.03.005>

#### RESOURCES

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**Poland, T.M.; Patel-Weyand, T.; Finch, D.M.; Ford Miniati, C.; Hayes, D.C.; Lopez, V.M., eds. 2021.** Invasive Species in Forests and Rangelands of the United States: A Comprehensive Science Synthesis for the United States Forest Sector. Heidelberg, Germany: Springer International Publishing. 455p. <https://doi.org/10.1007/978-3-030-45367-1>.

**Oregon Department of Forestry. 2021.** Sudden oak death (*Phytophthora ramorum*) Forest Health Fact Sheet, April. 2 pgs. <https://www.oregon.gov/ODF/Documents/ForestBenefits/SOD.pdf>  
[Note the map and other disease distribution details are out of date, due to the recent detections described above, see page 1.]