



CALIFORNIA OAK MORTALITY TASK FORCE REPORT AUGUST 2009

MONITORING

***P. ramorum* has been confirmed in MacKerricher State Park, 3 miles north of Fort Bragg** in Mendocino County, and approximately 40 miles south of the nearest known positive site in Humboldt County. The MacKerricher site is now the northernmost location within Mendocino County from which the pathogen has been isolated. The previous northernmost site was a stream bait positive in the Little River of Van Damme State Park, approximately 16 miles south of MacKerricher. The closest known terrestrial collection of *P. ramorum* is near the mouth of the Navarro River, approximately 20 miles south of MacKerricher State Park.

Laboratory confirmation was based on samples taken from a stem canker on a living tanoak and a sprout canker growing from the base of a dead tanoak. Surveys have yielded the discovery of 13 dead and eight symptomatic tanoak within the Pinewood Campground loop. Other potential host species that have been sampled include huckleberry, cascara, and hairy honeysuckle. Results of these samples are not known at this time. The original source of inoculum is not known.

The site is within a well-used campground. The primary overstory trees in the vicinity of the infections are Bishop pine and tanoak, with a minor amount of grand fir and wax myrtle. Primary understory vegetation is blue huckleberry, cascara, and wax myrtle, with the forest floor comprised of salal, bracken fern, and fairybells. California bay laurel, commonly associated with newly infected, isolated sites is not found within or adjacent to the infested campground area.

Cal Fire is currently working with State Parks personnel to develop a management plan for the park. This will include removal of dead and infected trees as well as preventative measures such as putting wood chips or gravel on exposed soil of parking spaces and trails near the infected location. View [Mendocino map](#).

NURSERIES

A Pierce County, Washington retail nursery was found with two *P. ramorum*-positive *Rhododendron* cultivars in May and June, 2009. The nursery was also found positive in 2003 with two cultivars of *Camellia*, and in 2004 with 14 cultivars of *Camellia* and *Rhododendron*. Per the Confirmed Nursery Protocol, a perimeter survey was conducted and several salal (*Gaultheria shallon*) plants in one colony were found to be *P. ramorum*-positive on a bank outside the nursery on County land. Water from the infested nursery area drains into the native salal stand. APHIS is working with the County to clean up the site. APHIS is also cooperating with the Washington State Department of Agriculture, the US Forest Service, and the Washington Department of Natural Resources to further survey and bait the drainage area. This is a documented incident of *P. ramorum* moving out of an infested nursery and causing disease outside the nursery. For more information on *Gaultheria shallon*, go to the COMTF Host of the Month Archive at



http://nature.berkeley.edu/comtf/html/host_of_the_month_archive.html#GaultheriaShallon. For photos and a map of salal distribution, go to the USDA Plants Profile website at <http://plants.usda.gov/java/nameSearch?keywordquery=+Gaultheria+shallon+&mode=science>.

On July 1, 2009, it was confirmed that a retail nursery in Transylvania County, NC was infested with *P. ramorum*-infected *Rhododendron* 'Capistrano'. The nursery was found positive as the result of a Cooperative Agricultural Pest Survey inspection. This nursery has never previously been positive for *P. ramorum* and does not ship interstate. Trace-back investigations have been completed; all results were negative.

Oregon's fifth 2009 *P. ramorum*-positive nursery was identified in mid-July. The pathogen was detected at a small Clackamas County retail nursery on a *Rhododendron* 'Baden Baden' and a *Viburnum tinus* during a routine annual compliance survey. The nursery is cooperating fully with the eradication effort. Delimitation surveys have been completed and testing of the plant and soil samples is currently underway. This nursery has never previously been positive for *P. ramorum*. For more information on the trace-forward and -back investigations, contact Don Givens at donald.r.givens@aphis.usda.gov.

On July 13th, the California Department of Food and Agriculture and County Agricultural Commissioners welcomed representatives from the National Plant Board, USDA, and California Association of Nurseries and Garden Centers (CANGC) to witness the State's implementation of the federal domestic quarantine restrictions for Light Brown Apple Moth (LBAM) and *P. ramorum* at nurseries in California that ship interstate. Following a day of presentations and orientation to the programs and a tour of the Plant Pest Diagnostics Branch Laboratory, the group traveled to California's coastal counties impacted by both pests to tour several nursery facilities. County Agricultural Commissioners and USDA project staff provided demonstrations of LBAM and *P. ramorum* inspections. Nursery owners, strawberry growers, and cut flower operation managers presented information and answered questions for the Plant Board Members. The tour ended with visits to nurseries in the Central Valley operating under the *P. ramorum* compliance agreement. For more information on the tour, contact Kathy Kosta at KKosta@cdfa.ca.gov.

RESEARCH

Bulajić, A.; Jović, J.; Krnjajić, S.; Djekić, I.; and Krstić, B. 2009. First report of *Phytophthora ramorum* on *Rhododendron* sp. in Serbia. Plant Pathology 58:804. DOI: 10.1111/j.1365-3059.2009.02033.x.

In Europe, *Phytophthora ramorum* has been reported on a range of ornamentals as well as on a limited number of tree species in at least in 11 countries: UK, Spain, Belgium, Germany, the Netherlands, Italy, France, Switzerland, Poland, Slovenia, France, and Norway (<http://rapra.csl.gov.uk>). It is recorded mainly on *Rhododendron* but other hosts



including *Camellia*, *Kalmia*, *Pieris*, and *Viburnum* are also affected. This pathogen is regarded to be a potential source of inoculum for tree epidemics in Europe.

In June 2008, symptoms resembling those of *P. ramorum* were observed on 12 specimens of *Rhododendron* sp. cv. Baden - Baden in an open garden in the vicinity of Zemun, Serbia. Plants with symptoms of leaf necrosis and blight and petiole necrosis were sampled and examined. Pieces of leaf tissue from the edge of lesions were surface-sterilized (70% ethanol) and placed on carrot piece agar, CPA (Werres *et al.*, 2001). After 4–7 days incubation, isolates were slow growing with numerous semipapillate caducous sporangia ((35–80 (54) × 17–32 (26) μm) and large chlamydozoospores (average diameter 48 μm). The mating type was determined as A1, due to formation of typical sexual structures when crossed with A2 mating type of *P. cinnamomi* and *P. cryptogea*. The identity of the isolates was confirmed by PCR using Phyto1/4 primer pair (Hayden *et al.*, 2004). A representative isolate (Pr92-08) was sequenced (GenBank Accession No. EU915480) and the ITS sequence was identical to other *P. ramorum* isolates on NCBI GenBank database.

Pathogenicity was confirmed by inoculation of non-wounded detached leaves (Denman *et al.*, 2005) of 15 different host plants. First necrotic spots were noticeable after 3 day incubation in moist chamber in laboratory on *Rhododendron variegatum*, *R. morgenrot*, and *Viburnum plicatum*. The control leaves, inoculated with sterile water, showed no reactions. In all cases, the pathogen was successfully recovered from leaves with symptoms and also detected using PCR.

This is the first report of *P. ramorum* on *Rhododendron* plants in Serbia. The infected plants were destroyed and measures were taken to eradicate the pathogen according to EU legislation. The discovery of infected *Rhododendron* plants should prompt more detailed surveys, thorough inspections, and subsequent testing in other areas of Serbia.

Elliott, M.; Sumampong, G.; Varga, A.; Shamoun, S.F.; James, D.; Masri, S.; Brière, S.C.; and Grünwald, N.J. 2009. PCR-RFLP markers identify three lineages of the North American and European populations of *Phytophthora ramorum*. *Forest Pathology* 39:266–278. DOI: 10.1111/j.1439-0329.2008.00586.x.

Phytophthora ramorum, the cause of sudden oak death and ramorum blight, has three major clonal lineages and two mating types. Molecular tests currently available for detecting *P. ramorum* do not distinguish between clonal lineages and mating type is determined by cultural methods on a limited number of samples. In some molecular diagnostic tests, cross-reaction with other closely related species such as *P. hibernalis*, *P. foliorum* or *P. lateralis* can occur. Regions in the mitochondrial gene Cox1 are different among *P. ramorum* lineages and mitochondrial genotyping of the North American and European populations seems to be sufficient to differentiate between mating types, because the EU1 lineage is mostly A1 and both NA1 and NA2 lineages are A2. In our study, we were able to identify *P. ramorum* isolates according to lineage using polymerase chain reaction-restriction fragment-length polymorphism (PCR-RFLP) of the Cox1 gene, first by using ApoI to separate *P. ramorum* from other species and EU1 from



North American populations, and then Aval to distinguish between NA1 and NA2 genotypes. However, *P. foliorum* had the same restriction profile as *P. ramorum* NA1 isolates.

RELATED RESEARCH

Reglinski, T.; Spiers, T.M.; Dick, M.A.; Taylor, J.T.; and Gardner, J. 2009. Management of phytophthora root rot in radiata pine seedlings. *Plant Pathology* 58:723–730. DOI: 10.1111/j.1365-3059.2009.02021.x.

Sosnowski, M.R.; Fletcher, J.D.; Daly, A.M.; Rodoni, B.C.; and Viljanen-Rollinson, S.L.H. 2009. *Review.* Techniques for the treatment, removal and disposal of host material during programmes for plant pathogen eradication. *Plant Pathology* 58:621–635. DOI: 10.1111/j.1365-3059.2009.02042.x.

RESOURCES

The “Quarantine Barcoding of Life” (QBOL) website has been launched. Funded by the European Union, QBOL is made up of a consortium of 20 partners (universities, research institutes, and phytosanitary organizations) from around the world working together and sharing their expertise in the field of DNA barcoding of arthropods, bacteria, fungi, nematodes, phytoplasmas, and viruses. The goal of the website is to make collections harboring plant pathogenic quarantine organisms available. This will be done through DNA barcoding from vouchered specimens using informative genes from selected species on the EU Directive and EPPO lists. In the next three years the sequences, together with taxonomic features, will be included in an Internet-based database system. To access the QBOL website, go to www.qbol.org. For more information on QBOL, contact Peter Bonants at peter.bonants@wur.nl.

CALENDAR OF EVENTS

8/13 - Montalvo Arts Center Presents: O OAKS OH!: Part 1 of 2 (Part 2 is scheduled for 12/2); 15400 Montalvo Road, Saratoga; 10:00 a.m. – 4:30 p.m.; A daylong participatory artwork weaving together science, culture, nature, ritual, and spirituality to confront the ecological phenomenon of Sudden Oak Death with creativity. For more information, go to http://montalvoarts.org/events/mierle_ukeles/ or contact Becki Gervin at (408) 961-5814 or bgervin@montalvoarts.org.

10/27 – 10/28 –Continental Dialogue on Non-Native Forest Insects and Diseases Fifth Meeting; Fort Mason Center, San Francisco; For more information on the meeting, contact Mark Lewis at mlewis@resolv.org or (202) 965-6211 or Dana Goodson at dgoodson@resolv.org or (202) 965-6209. For more information about the Dialogue, go to: www.continentalforestdialogue.org.

3/7/10 – 3/12/10 - 5th IUFRO *Phytophthora* in Forest Trees and Natural Ecosystems Conference; Rotorua, New Zealand; For more information, contact Pam Taylor at pam.taylor@scionresearch.com.