



## CALIFORNIA OAK MORTALITY TASK FORCE REPORT FEBRUARY 2009

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### FEATURE ARTICLE

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**During the past four years (2005-2008), *Phytophthora ramorum* has been detected in 27 western Washington nurseries.** To date, 314 *P. ramorum* isolates have been collected from the 27 nurseries, as well as two streams, a retention pond, and one landscape site, and genotyped using four microsatellite markers (PrMs5, Pr9C3, PrMs39 and PrMs45).

All three previously described lineages (EU1, NA1, and NA2) were detected in each of the four years. In this population, the EU1 lineage is represented by one genotype, the NA2 lineage is represented by one genotype, and the NA1 lineage is represented by four genotypes. The NA1 lineage was the most common, occurring in 24 nurseries, one landscape situation, and both streams. The NA2 lineage was detected at 10 nurseries and one stream, while the EU1 lineage was detected at five nurseries. The occurrence of the EU1 lineage in Washington has increased in frequency over the past four years while the overall number of *P. ramorum* sites and isolates has declined. In four of the five sites where the EU1 lineage occurred, the NA1 lineage was also detected at the same time. At one nursery in 2007, these two lineages were isolated from different branches on the same rhododendron plant. At another nursery in 2008, they were isolated from the same soil bait. Although no genotype detected to date possesses a hybrid of alleles from both the European (EU1) and North American (NA1 and NA2) lineages, the presence of the EU1 and NA1 lineages on the same plant and soil bait illustrates the need for a better overall understanding of the population structure of *P. ramorum* in nurseries to reduce the risk of hybridized species occurring as a result of sexual recombination.

The APHIS confirmed nursery protocol (CNP) appears to be effective in eradicating the pathogen from infected nurseries in some instances. Fifteen of the 27 positive nurseries were negative for *P. ramorum* in subsequent years after completing the CNP. On the other hand, 12 nurseries were repeatedly positive for two or more years in a row. At only one repeat-positive nursery did a new genotype appear in the second positive year that was not present in the nursery during the first positive year. Thus it is unclear if inoculum was persisting from year to year or if the same genotypes that were initially detected at 11 of the repeat nurseries was reintroduced in subsequent years. At the six nurseries showing the most genetic variability, three different genotypes were detected in a single year.

For more information contact Gary Chastagner at Washington State University at [chastag@wsu.edu](mailto:chastag@wsu.edu) or Katie Coats at [kpcoats@wsu.edu](mailto:kpcoats@wsu.edu).

### REGULATIONS

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**The USDA Animal and Plant Health Inspection Service (APHIS) will be adding *Choisya ternate* (Mexican orange) and *Ribes laurifolium* to the federally regulated list of *P. ramorum* associated hosts.** The newly identified hosts were found at a UK nursery in February 2008 with foliar dieback symptoms.



**The Canadian Food Inspection Agency (CFIA) has completed a new risk assessment for *P. ramorum*.** The principal conclusions are that the disease is unlikely to become established in the Canadian environment, with the exception of south coastal British Columbia, where the risk remains medium. The pathogen will remain a quarantine pest for Canada. It is anticipated that the risk assessment will be posted to the CFIA website soon. For more information, contact Shane Sela at [shane.sela@inspection.gc.ca](mailto:shane.sela@inspection.gc.ca).

#### **NURSERIES**

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**A Nursery in Cumming, Forsyth County, GA was found to have *P. ramorum*-positive *Viburnum* Sp. 'Davidii' on December 16, 2008 as a result of a Pest Detection Survey Inspection.** Additional *P. ramorum*-positive leaves (five separate species) were confirmed January 6, 2009. The leaves were from a collection of leaf litter.

**Washington State had two *P. ramorum*-positive residential landscape finds** confirmed on January 9, 2009 as a result of trace-forward inspections. One site was in Olympia, Thurston County, and the other was in Bremerton, Kitsap County. The positive plants found at both locations were *Rhododendrons*.

**As part of the regulatory program for *P. ramorum* in California, 1,267 nurseries** were surveyed in 2008. Of those nurseries surveyed, 618 contained host material and were surveyed at the compliance agreement level (at least 40 samples per location). Thirteen inspected sites did contain *P. ramorum*-positive samples, of which 7 were located in non-infested counties, and 6 were located in infested counties. The positive detections were made through the following survey efforts: 8 compliance agreement inspections; 1 CA nursery stock cleanliness inspection; 1 trace-forward inspection; 1 self reported; 1 non-program related nursery stock inspection; and 1 re-inspection from a 2007 positive confirmation. At the 13 positive nurseries, infested material included: 41 *Camellia* sp.; 2 *Leucothoe fontanesiana*; 2 *Loropetalum* sp.; 2 *Michelia* sp.; 4 *Pieris japonica*; 9 *Rhododendron* sp.; and 4 soil.

**Washington State Department of Agriculture Plant Services Specialists inspected** 320 production nurseries and 538 retail nurseries, and processed 19,965 samples for *P. ramorum* in 2008. Five of the nurseries inspected were placed under USDA Emergency Action Notification for the pathogen (1 landscape/wholesaler in Clark County, 1 retailer and 1 wholesaler in King County, 1 landscape/wholesaler in Snohomish County, and 1 landscape/wholesaler in Thurston County). Only one of the nurseries was a repeat positive. Since 2004, Washington has had fewer *P. ramorum*-positive nurseries each year.

One wholesale nursery in King County, WA, and another in Clark County, WA, each had a single PCR positive sample found during 2008 inspections; however, symptomatic plants were not found during a second inspection at either facility. Consequently, neither fell under USDA regulation due to the new Potentially Actionable Suspect Sample protocol, which requires a second positive sample be confirmed before federal action is taken. The positive blocks at both sites have been destroyed.



**The CFIA 2008 National Survey for *P. ramorum* included approximately 10,300** samples from 262 nursery locations throughout Canada. One hundred and forty-seven locations in British Columbia were sampled, which represents the majority of nurseries importing plant material. The pathogen was detected in plants at six nurseries in the greater Vancouver and Victoria areas of British Columbia. Eradication actions were ordered at all positive locations, and were also being completed at an additional six nurseries found to have infected plants in 2007. For more information, contact Shane Sela at [shane.sela@inspection.gc.ca](mailto:shane.sela@inspection.gc.ca).

## RESEARCH

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**The Fourth Sudden Oak Death Science Symposium will be held June 15 – 18, 2009** at the [Hilton in Scotts Valley](#), near Santa Cruz. This conference is aimed at researchers, natural resource and horticultural managers, regulators, policy makers, and public and private interest groups. The agenda will include an afternoon field trip on 6/15, presentations and a poster session on 6/16 and 6/17, and a half-day COMTF-wide management meeting on 6/18. Hotel reservations at the discounted Symposium rate can be made at: <http://www.hilton.com/en/hi/groups/personalized/SJCSVHF-SODS-20090612/index.jhtml>.

**A Call for Papers and Posters has been issued for the Fourth SOD Science Symposium.** Abstracts (up to 1-page) of proposed papers or posters are due by February 13, 2009. These should be submitted via e-mail to Katie Palmieri at [palmieri@nature.berkeley.edu](mailto:palmieri@nature.berkeley.edu) using the [correct format](#) and should *clearly state if you would like to present a paper or a poster*.

Submissions should focus on one of the following areas addressing Sudden Oak Death/*P. ramorum*: biology and pathology; organisms associated with *P. ramorum*; ecology; economic and social impacts; modeling and risk assessment; restoration; management and control strategies; monitoring; silviculture; arboriculture and urban forestry; nursery management; policy; or other related topics.

A peer-reviewed, Symposium proceedings will be produced. Authors are expected to provide manuscripts. *For authors with research results submitted to other journal outlets, extended abstracts will be accepted in lieu of manuscripts.* Complete instructions for paper preparation will be sent out with abstract acceptance notifications.

Authors of accepted papers and posters will be notified by March 13, 2009. For more information, contact Katie Palmieri at (530) 344-7530 or [Palmieri@nature.berkeley.edu](mailto:Palmieri@nature.berkeley.edu).

**Balci, Y.; Balci, S.; MacDonald, W.L.; and Gottschalk, K.W. 2008. Relative susceptibility of oaks to seven species of *Phytophthora* isolated from oak forest soils. Forest Pathology 38, 394–409. DOI: 10.1111/j.1439-0329.2008.00559.x.**



**Tjosvold, S.A.; Chambers, D.L.; Koike, S.T.; and Mori, S. R. 2008. Disease on nursery stock as affected by environmental factors and seasonal inoculum levels of *Phytophthora ramorum* in stream water used for irrigation. Plant Disease 92:1566-1573.**

Abstract: A pear bait monitoring system was used to detect and quantify *Phytophthora ramorum* propagules in streams that flow through woodland areas with sudden oak death in Santa Cruz County, CA from 2001 to 2007. Stream propagules were detected most frequently or occurred in highest concentrations in winter and spring. The stream propagule concentration was characterized with statistical models using temperature and rainfall variables from 2004 to 2007. The highest concentrations of propagules occurred when stream sampling was preceded by about 2 months with low maximum daily temperatures and by 4 days with high rainfall. The occurrence of propagules in streams in the summer was mostly associated with infected leaves from the native host *Umbellularia californica* that prematurely abscised and fell into the water. When the stream water was used for irrigating rhododendron nursery stock from 2004 to 2007, disease occurred only three times in the two wettest springs (2005 and 2006) on plants sprinkler irrigated with stream water with relatively high concentrations of propagules. Disease incidence was described with a statistical model using the concentration of infective propagules as measured by pear baiting and consecutive hours of leaf wetness measured by electronic sensors at rhododendron height. The concentration of infective propagules was significantly reduced after water was pumped from the stream and applied through sprinklers.

**Widmer, T.L. 2009. Infective potential of sporangia and zoospores of *Phytophthora ramorum*. Plant Disease 93:30-35.**

Abstract: *Phytophthora* species produce sporangia that either germinate directly or release zoospores, depending upon environmental conditions. Previous *Phytophthora* spp. inoculation trials have used both sporangia and zoospores as the inoculum type. However, it is unknown what impact propagule type has on disease. Rhododendron leaf disks were inoculated with *P. ramorum* zoospores (75, 500, or 2,400 per disk), sporangia (75 per disk), or sporangia plus trifluoperazine hydrochloride (TFP) (75 per disk), a chemical that inhibits zoospore formation. Combining results from two different isolates, the highest concentration of zoospores (2,400 per disk) induced a significantly higher percentage of necrotic leaf disk area (96.6%) than sporangia (87.6%) and 500 zoospores per disk (88.7%). The sporangia plus TFP treatment had the lowest necrosis at 47.5%. Rooted rhododendron cuttings had a higher percentage of necrotic leaves per plant when inoculated with zoospores (3,000 or 50,000 per ml) or cysts (50,000 per ml) than with sporangia (3,000 per ml) with or without TFP. The percentage of necrotic leaf area was significantly higher when cysts or zoospores were inoculated at 50,000 per ml than sporangia without TFP and zoospores at 3,000 per ml. All treatments were significantly higher in the percentage of necrotic leaf area than the leaves treated with sporangia plus TFP. This demonstrates that the full inoculum potential may not be achieved when sporangia are used as the inoculum propagule.

**RELATED RESEARCH**

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**Adams, G.C.; Catal, M.; Trummer, L.; Hansen, E.M.; Reeser, P.; and Worrall, J.J.** 2008. *Phytophthora alni* subsp. *uniformis* found in Alaska beneath thinleaf alders. Online. Plant Health Progress. DOI: 10.1094/PHP-2008-1212-02-BR.

**Quesada-Ocampo, L.M.; Fulbright, D.W.; and Hausbeck, M.K.** 2009. Susceptibility of Fraser fir to *Phytophthora capsici*. Plant Disease 93:135-141.

**Zeng, Hui-cai; Ho, Hon-hing; and Zheng, Fuy-Cong.** 2009. A Survey of *Phytophthora* Species on Hainan Island of South China. J. Phytopathology 157, 33–39. DOI: 10.1111/j.1439-0434.2008.01441.x.

**OUTREACH AND EDUCATION**

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**Spring 2009 *P. ramorum* Preventative Treatment Training sessions will be offered** on the UC Berkeley campus. Each two-hour outdoor session will cover basic Sudden Oak Death information, integrated pest management approaches, how to select candidate trees for treatment, and proper preventative treatment application. CEU credits will be offered for DPR, ISA, SAF, and California Urban Forestry Council. For more information, see the “Calendar of Events” below.

**Five Sudden Oak Death (SOD) Blitz outreach efforts are being planned for spring 2009.** Tentative Blitz locations include Woodside, Sonoma County, Monterey County, Los Altos, and the East Bay. SOD Blitz participants will be given a two-hour training on how to identify SOD symptoms, correctly sample symptomatic plants, and document sample locations. Samples will then be taken to the UC Berkeley Garbelotto lab where they will be analyzed to determine the presence or absence of *P. ramorum*. Laboratory results will be used to generate maps of disease distribution within surveyed areas. For more information on the Blitzes, go to <http://nature.berkeley.edu/garbelotto/english/sodblitz.php>.

**A new Spanish language version of Oregon’s online *P. ramorum* training course is** now available to nursery growers. Both the English and Spanish courses are offered by the Oregon State University Extended Campus (Ecampus), in partnership with the Oregon Department of Agriculture. The free, non-credit course includes three modules: biology, symptoms, and diagnosis; disease management; and *P. ramorum*. For an optional \$100 fee, nursery growers can earn a Certificate of Mastery after successfully completing an online exam. Those who pass the exam can also earn four pesticide recertification credits in Oregon. To access the English and Spanish language version of the *Phytophthora* Online Course: Training for Nursery Growers, visit [www.ecampus.oregonstate.edu/phytophthora](http://www.ecampus.oregonstate.edu/phytophthora).

**PERSONNEL**

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**Nicole Palkovsky will be joining the UC Cooperative Extension office in Marin as** the Sudden Oak Death Outreach Associate. In this role, she will be assisting Janice Alexander in Extension and Task Force education and outreach efforts. Nicole served as



the coordinator of the Marin Sudden Oak Death Task Force, and later the COMTF, from 2000-2002. Nicole looks forward to reconnecting with familiar faces and meeting many new ones. She can be reached by phone at (415) 499-3281 or via email at [npalkovsky@co.marin.ca.us](mailto:npalkovsky@co.marin.ca.us).

#### CALENDAR OF EVENTS

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- 2/11 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC**  
Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. This class is free and will be held rain or shine. To register, email [SODtreatment@nature.berkeley.edu](mailto:SODtreatment@nature.berkeley.edu), and provide your name, phone number, affiliation (if applicable), and the date for which you are registering. For more information, go to <http://nature.berkeley.edu/garbelotto/english/sodtreatmenttraining.php> or contact Katie Palmieri at (510) 847-5482 or [palmieri@nature.berkeley.edu](mailto:palmieri@nature.berkeley.edu).
- 2/13 - Call for Papers abstract submission deadline for Fourth Sudden Oak Death Science Symposium.** Additional details can be found in “Research” above. For more information, or to submit your abstract, contact Katie Palmieri at [palmieri@nature.berkeley.edu](mailto:palmieri@nature.berkeley.edu).
- 2/20 - 2009 *P. ramorum* Request for Proposals submission deadline for USDA FS,** Pacific Southwest Region, State and Private Forestry, Forest Health Protection.; The grant selection process will be accelerated this year, so please be sure to submit proposals on time. For a copy of the announcement, or for questions, contact Phil Cannon at: [pcannon@fs.fed.us](mailto:pcannon@fs.fed.us) or (707) 562-8913.
- 3/11 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC**  
Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 2/11 listing above.
- 4/22 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC**  
Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 2/11 listing above.
- 5/6 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC**  
Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 2/11 listing above.
- 6/15 – 6/18 –Fourth Sudden Oak Death Science Symposium; Hilton, Scotts Valley** (near Santa Cruz); For Symposium registration information, go to <http://nature.berkeley.edu/comtf/sodsymposium4/> or contact Janice Alexander at [JAlexander@ucdavis.edu](mailto:JAlexander@ucdavis.edu). For submission of abstracts, conference logistics, and facilities information, contact Katie Palmieri at [Palmieri@nature.berkeley.edu](mailto:Palmieri@nature.berkeley.edu). For hotel room reservations go to <http://www.hilton.com/en/hi/groups/personalized/SJCSVHF-SODS-20090612/index.jhtml>.