



CALIFORNIA OAK MORTALITY TASK FORCE REPORT DECEMBER 2006

Note: The COMTF report is produced 11 months a year. There will be no report in January 2007. The next report will be issued in the first week of February 2007.

MANAGEMENT

An update on Sudden Oak Death in Oregon: Sudden Oak Death was first discovered in Oregon forests in July 2001. Since then Oregon cooperators have been attempting to eradicate the pathogen by cutting and burning all infected and nearby host plants. On most sites (except BLM ownership) herbicides are used to kill sprouts and prevent stump-sprouting.

During the first four years of the eradication effort, the number of new infested sites and infected trees decreased each year. That trend ended in 2005 (the fifth year of the eradication program) when the number of trees and the number of new infested acres increased compared to the previous year.

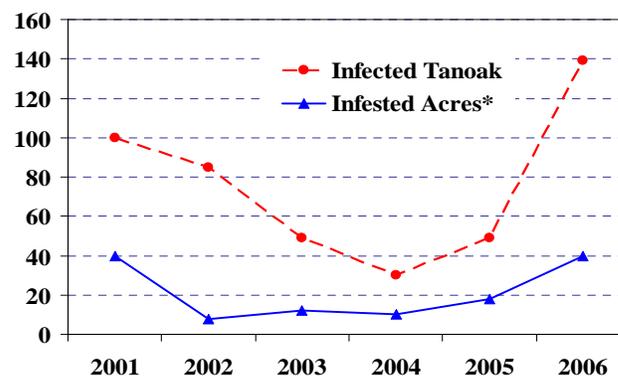
In 2006, 35 new infested sites (139 infected tanoak trees) were discovered. Two of the new sites occurred outside of the quarantine zone: one was 1 mile to the east, and the other 1.5 miles to the west of the boundary. Each of these sites was more than 2 miles from a known infested site. Most of the other new sites were small (less than 1 acre) and scattered near the center of the quarantine zone along the North Fork Chetco River and its tributaries. The largest new site covered 10 acres and contained more than 40 infected trees. In addition to the new sites, six existing eradication sites were expanded to include infected trees that were found near their perimeters.

The new infection is attributed to two consecutive years of unusually wet springs and early summer weather. The 2006 weather, in particular, appeared to favor long -distance spread of *P. ramorum*.

Sudden Oak Death in Oregon Forests

4 December 2006

Acres or Trees



*The estimated of number of infested acres includes new infested sites and expansions of eradication sites existing prior to 2006.



Several of Oregon's treated sites appear to be pathogen-free two years after treatment, and the pathogen has not expanded from these sites. Repeated aerial surveys, ground surveys, and stream monitoring throughout southwest Oregon have failed to detect the pathogen in forests beyond the area near the town of Brookings. Efforts to eradicate the pathogen from Oregon forests likely will continue for several years. For more information, contact Alan Kanaskie, Oregon Department of Forestry, at: akanaskie@odf.state.or.us or Ellen Goheen, USDA-Forest Service, at: egoheen@fs.fed.us.

While Congress has not passed the fiscal year 2007 federal budget, it is anticipated that the USDA Forest Service Pacific Southwest Region Sudden Oak Death program budget will be approximately \$600,000. For the first time, the Region will be issuing a Sudden Oak Death management and monitoring request for proposals (RFP) in 2007. In past years the Region awarded over \$1 million for Sudden Oak Death survey, treatment, and education without a formal RFP process. The competitive RFP will be issued soon. (Note that this request excludes funding for research. The Pacific Southwest Research Station 2007 *Phytophthora ramorum*/ Sudden Oak Death Research Request for Proposals is still pending the finalization of the Forest Service Research budget.) For a copy of the Region's announcement, contact Phil Cannon, Regional Forest Pathologist, at: pcannon@fs.fed.us or (707) 562-8913.

NURSERIES

A California production nursery in Santa Clara County was confirmed positive for *P. ramorum* on 11/9/06. The positive *Vancouveria planipetala* (redwood ivy) was collected during an initial compliance agreement inspection. The nursery is not currently under compliance and does not ship or intend to ship out of the quarantined counties.

Five *P. ramorum* nursery training sessions will be offered for wholesale, production, and retail nursery personnel in January and February 2007. The free half-day trainings will be offered in San Diego, Orange, Ventura, Fresno, and Sacramento Counties; however, surrounding counties are welcome to attend the sessions. Additional training information can be found in the Calendar of Events below.

RESEARCH

Sudden Oak Death Science Symposium III registration information is now available on the Symposium website at:

<http://nature.berkeley.edu/comtf/sodsymposium/index.html>. Conference room rates are based on availability, so please register and make room reservations under the SOD Science Symposium III room block as soon as possible. For more information, contact Katie Palmieri at: (916) 435-3230 or palmieri@nature.berkeley.edu.

The XVI International Plant Protection Congress 2007 will be held in Glasgow, UK, from October 15-18. At the meeting a session will be dedicated to *P. ramorum* and related pathogens, which will examine how the introduction of *P. ramorum* into the US and Europe has required a comprehensive program of emergency statutory measures and



research to mitigate against further spread and damage. Papers are being sought on the biology, epidemiology and management of *P. ramorum* as well as other related pathogens which have been newly introduced into new geographic areas. For more information on the meeting, see the Calendar of Events below.

The current issue of Molecular Plant-Microbe Interactions, “Focus on *Phytophthora ramorum* genomics,” (December 2006) can be found at:

<http://www.ismpminet.org/mpmi/current/top.asp>. The following eight citations are abstracts from the papers that are *P. ramorum*-relevant.

Govers, Francine and Gijzen, Mark. 2006. [Phytophthora Genomics: The Plant Destroyers’ Genome Decoded](#). The American Phytopathological Society. MPMI 19:1295-1301. [DOI: 10.1094/MPMI-19-1302](#).

Zhang, Xuemin; Scheuring, Chantel; Tripathy, Sucheta; Xu, Zhanyou; Wu, Chengcang; Ko, Angela; Tian, S. Ken; Arredondo, Felipe; Lee, Mi-Kyung; Santos, Felipe A.; Jiang, Rays H.Y.; Zhang, Hong-Bin, and Tyler, Brett M. 2006. [An Integrated BAC and Genome Sequence Physical Map of *Phytophthora sojae*](#). The American Phytopathological Society. MPMI 19:1302-1310. [DOI: 10.1094/MPMI-19-1311](#).

Jiang, Rays H. Y., Tyler, Brett M., and Govers, Francine. 2006. [Comparative Analysis of *Phytophthora* Genes Encoding Secreted Proteins Reveals Conserved Synteny and Lineage-Specific Gene Duplications and Deletions](#). The American Phytopathological Society. MPMI 19:1311-1321. [DOI: 10.1094/MPMI-19-1322](#).

Tripathy, Sucheta and Tyler, Brett M. 2006. [The Repertoire of Transfer RNA Genes Is Tuned to Codon Usage Bias in the Genomes of *Phytophthora sojae* and *Phytophthora ramorum*](#). The American Phytopathological Society. MPMI 19:1322-1328. [DOI: 10.1094/MPMI-19-1329](#).

Krampis, Konstantinos, Tyler, Brett M., and Boore, Jeffrey L. 2006. [Extensive Variation in Nuclear Mitochondrial DNA Content Between the Genomes of *Phytophthora sojae* and *Phytophthora ramorum*](#). The American Phytopathological Society. MPMI 19:1329-1336. [DOI: 10.1094/MPMI-19-1337](#).

Meijer, Harold J. G. and Govers, Francine. 2006. [Genomewide Analysis of Phospholipid Signaling Genes in *Phytophthora* spp.: Novelty and a Missing Link](#). The American Phytopathological Society. MPMI 19:1337-1347. [DOI: 10.1094/MPMI-19-1348](#).

Meijer, Harold J. G.; van de Vondervoort, Peter J. I.; Yin, Qing Yuan; de Koster, Chris G.; Klis, Frans M.; Govers, Francine; and de Groot, Piet W. J. 2006. [Identification of Cell Wall-Associated Proteins from *Phytophthora ramorum*](#). The American Phytopathological Society. MPMI 19:1348-1358. [DOI: 10.1094/MPMI-19-1359](#)



Lamour, Kurt H.; Finley, Ledare; Hurtado-Gonzales, Oscar; Gobena, Daniel; Tierney, Melinda; and Meijer, Harold J. G. 2006. [Targeted Gene Mutation in *Phytophthora* spp.](#) The American Phytopathological Society. MPMI 19:1359-1367.

The “Proceedings of the Sudden Oak Death Second Science Symposium: The State of Our Knowledge” is now available online at:

http://www.fs.fed.us/psw/publications/documents/psw_gtr196/. Hardcopy versions will be available in early 2007. Topics covered by the 90 papers and 46 posters include biology, genetics, nursery and wildland management, monitoring, ecology, and diagnostics. Several papers on *P. kernoviae* and other forest *Phytophthora* species are also presented. For more information contact, Susan Frankel, at sfrankel@fs.fed.us.

Hughes, K.J.D., Giltrap, P.M., Barton, V.C., Hobden, E., Tomlinson, J.A., and Barber, P. 2006. On-site real-time PCR detection of *Phytophthora ramorum* causing dieback of *Parrotia persica* in the UK. *Plant Pathology* 55, 813. Doi: 10.1111/j.1365-3059.2006.01461.x.

In November 2004, DEFRA's PHSI collected samples from a public garden in south Wales where *P. ramorum* was under eradication. Each sample was tested on-site by CSL personnel using Real-time (TaqMan®) PCR for *P. ramorum* on a Cepheid SmartCycler ([Tomlinson et al., 2005](#)). This identified *P. ramorum* on *Parrotia persica* (Persian ironwood; Hamamelidaceae), which was causing necrotic leaf lesions and twig dieback. Duplicate material was also sent to CSL where *P. ramorum* was consistently isolated from both stem and leaf tissue following surface decontamination and isolation onto semi-selective medium ([Lane et al., 2002](#)). An ITS sequence was obtained from a culture of *P. ramorum* isolated from *P. persica* (GenBank DQ066919) and this was identical to other *P. ramorum* isolates on GenBank. Pathogenicity of the isolate was confirmed by wound inoculating healthy leaves of *P. persica* with mycelial plugs and incubating these in a damp chamber at room temperature (*c.* 20°C) in the laboratory for six days. Extensive lesions developed on the leaves and the pathogen was re-isolated from the leading edge, thus completing Koch's postulates. Healthy wounded leaves, inoculated with agar alone, did not develop symptoms.

This is the first report of *P. ramorum* affecting *P. persica*. The infected plant was destroyed and measures were taken to eradicate the pathogen according to European Union phytosanitary legislation. The EU was notified.

Ioos1, Renaud, Laugustin, Lise, Schenck, Nathalie, Rose, Sylvie, Husson, Claude, and Frey, Pascal. 2006. Usefulness of single copy genes containing introns in *Phytophthora* for the development of detection tools for the regulated species *P. ramorum* and *P. fragariae*. *European Journal of Plant Pathology* 116:171–176. DOI: 10.1007/s10658-006-9051-2.

Abstract: Introns are generally highly polymorphic regions within genes and were proven to be of great interest for discriminating among phylogenetically-close *Phytophthora*



species. *Phytophthora ramorum* and *P. fragariae* are considered as quarantine pathogens by the European Union and accurate detection tools are therefore necessary for their monitoring. From introns located in different single copy genes (*GPA1*, *RAS*-like, and *TRP1*), we developed a series of PCR primers specific to *P. ramorum* and *P. fragariae*. The specificity of these primers was successfully checked with a wide collection of *Phytophthora* isolates and a protocol was developed to detect both pathogens directly in infected plant tissues. These genes should be of particular interest for the development of additional species-specific detection tools within the *Phytophthora* genus.

Meyers, Katherine J., Swiecki, Tedmund J., and Mitchell, Alyson E. 2006.

Understanding the Native Californian Diet: Identification of Condensed and Hydrolyzable Tannins in Tanoak Acorns (*Lithocarpus densiflorus*). *Journal of Agricultural and Food Chemistry* 54, 7686-7691.

Abstract: The tanoak (*Lithocarpus densiflorus*) acorn was a staple food in the Native American diet and is still used in traditional dishes. Acorns from the genus *Quercus* have been shown to contain a large range of hydrolyzable tannins. However, neither hydrolyzable nor condensed tannins have been characterized in tanoak acorns. The aim of this study was to identify the full range of hydrolyzable and condensed tannins in extracts of tanoak acorns using liquid chromatography/electrospray ionization-mass spectrometry/mass spectrometry. Condensed tannins were identified as B type oligomers of (epi)-catechin (procyanidins) with a degree of polymerization up to six. Oligomers up to and including tetramers were identified by UV spectra and MS detection whereas pentamers and hexamers were detected only by MS. The total concentration of condensed tannins was 464 mg/100 g acorn pericarp. The concentration of propocyanidin monomers, dimers, trimers, and tetramers in acorn pericarp (mg/100 g acorn pericarp) were 95 ± 10.9 , 148 ± 35.0 , 90 ± 17.9 , and 131 ± 1.9 , respectively. No procyanidins were found in the acorn cotyledon tissue. A total of 22 hydrolyzable tannins were identified in methanolic extracts of acorn cotyledon tissue. Gallic acid derivatives predominated and included galloylated esters of glucose, hexahydrodiphenoyl esters of glucose, and methylated gallates. Galloylated esters of glucose were present as isomers of galloyl glucose, digalloyl glucose, and trigalloyl glucose. Mass spectral fragmentation patterns indicate the presence of one gallic acidgalloyl glucose isomer and two gallic acid-digalloyl-glucose isomers. No isomers of tetragalloyl glucose and pentagalloyl glucose were identified. Ellagic acid and ellagic acid pentoside were also identified.

Swain, S., Harnik, T., Mejia-Chang, M., Hayden, K., Bakx, W., Creque, J., and Garbelotto, M. 2006. Composting is an effective treatment option for sanitization of *Phytophthora ramorum*-infected plant material. *Journal of Applied Microbiology* ISSN 1364-5072. DOI:10.1111/j.1365-2672.2006.03008.x.

Abstract: Aims: To determine the effects of heat and composting treatments on the viability of the plant pathogen *Phytophthora ramorum* grown on both artificial and various natural substrates.



Methods and Results: *Phytophthora ramorum* was grown on V8 agar, inoculated on bay laurel leaves (*Umbellularia californica*) and on woody tissues of coast live oak (*Quercus agrifolia*). Effects on growth, viability and survival were measured as a result of treatment in ovens and compost piles. Direct plating onto PARP medium and pear-baiting techniques were used to determine post-treatment viability. No *P. ramorum* was recovered at the end of the composting process, regardless of the isolation technique used. By using a PCR assay designed to detect the DNA of *P. ramorum*, we were able to conclude the pathogen was absent from mature compost and not merely suppressed or dormant.

Conclusions: Some heat and composting treatments eliminate *P. ramorum* to lower than detectable levels on all substrates tested.

Significance and Impact of the Study: Composting is an effective treatment option for sanitization of *P. ramorum*-infected plant material. Assaying for pathogen viability in compost requires a direct test capable of differentiating between pathogen suppression and pathogen elimination.

FUNDING

The Midpeninsula Open Space District (MPOSD) will provide \$60,000 over the next three years for a [tanoak *P. ramorum* resistance project](#). Interested in regional parks, land trusts, and open space districts working more closely with one another to address Sudden Oak Death, the Midpeninsula Open Space District Board members, manager, and staff hope their efforts can serve as a model for others. The agreement will be between the MPOSD and the USDA Forest Service Pacific Southwest Research Station (PSW), and will support research at UC Berkeley (Dodd, Garbelotto, and Hayden) and USDA FS, PSW, (Jessica Wright). For more information, contact Cindy Roessler, Resource Management Specialist, MPOSD, at: croessler@openspace.org.

RESOURCES

Washington State University (WSU) has released a new online *P. ramorum* training module for nurseries. Currently available in Spanish, an English version will also be posted soon. The presentation provides training on *P. ramorum* symptoms as well as management considerations aimed at keeping the pathogen out of nurseries. Also discussed are ways to reduce economic impacts if *P. ramorum* is detected and how to reduce the risk of spreading the pathogen into the natural and urban landscape. To access the free training module, go to the WSU *P. ramorum* Research and Education website at: <http://www.puyallup.wsu.edu/ppo/resources.html>.

KUDOS

On November 8, 2006 the California Board of Forestry and Fire Protection presented Outstanding Achievement Awards to leaders of the multi-agency effort to suppress Sudden Oak Death (SOD) in Humboldt County. Honors went to Yana Valachovic, UC Cooperative Extension (UCCE) Humboldt/Del Norte Forest Advisor; Chris Lee, Humboldt County SOD Project Coordinator; Jack Marshall, CDF Forest Pathologist; and Hugh Scanlon, CDF Humboldt/Del Norte Battalion Chief.



The California Oak Mortality Task Force (COMTF) would also like to recognize the assistance of two forestry firms (Restoration Forestry and James Able Forestry), the private landowners who are participating in the study, Cal Trans for volunteering crews and planning, and the staff of and private contractors coordinated through the Southern Humboldt Fire Safe Council and UCCE.

The largest SOD landscape treatment to date in California (140 acres), this project was intended to suppress and contain *P. ramorum*, as well as serve as a landscape-scale adaptive management project, monitoring treatment sites to evaluate their efficacy for future responses. The four sites were treated between January and November 2006, and focused on the perimeters of the County's known infested area. Project funding was provided by the USDA Forest Service State and Private Forestry, CDF's Forest Improvement Program and Vegetation Management Program, and the Bureau of Land Management. Additional resources came from the California Department of Forestry and Fire Protection, UCCE, several private landowners, and California State Parks.

The COMTF would like to extend thanks to JoAnn Brand, a Marin County artist and long-time resident, who committed 10 percent of her profits from an open studio showing last month to the COMTF's Sudden Oak Death efforts.

ERRATUM

If you are using the COMTF "Sudden Oak Death Guidelines for Forestry" document, please check to be sure that bullet three under "Drafted water" recommends a ratio of 1 gallon of Ultra Clorox Bleach per 1,000 gallons of water for water sanitation. For the corrected version of the "Sudden Oak Death Guidelines for Forestry," go to the COMTF website (www.suddenoakdeath.org) under "Library" "Task Force Publications."

CALENDAR OF EVENTS

- 1/16/07 – Free Ventura County “*P. ramorum* in Nurseries: A Workshop for Retail, Wholesale, and Production Nursery Representatives; Additional Details will be forthcoming. For more information, contact Katie Palmieri at: palmieri@nature.berkeley.edu or (916) 435-3230.**
- 1/23/07 – Free Fresno County “*P. ramorum* in Nurseries: A Workshop for Retail, Wholesale, and Production Nursery Representatives; Additional Details will be forthcoming. For more information, contact Katie Palmieri at: palmieri@nature.berkeley.edu or (916) 435-3230.**
- 2/6/07 – Free Sacramento County “*P. ramorum* in Nurseries: A Workshop for Retail, Wholesale, and Production Nursery Representatives; Additional Details will be forthcoming. For more information, contact Katie Palmieri at: palmieri@nature.berkeley.edu or (916) 435-3230.**
- 2/22/07 – Free Orange County “*P. ramorum* in Nurseries: A Workshop for Retail, Wholesale, and Production Nursery Representatives; Additional Details will be**



forthcoming. For more information, contact Katie Palmieri at:
palmieri@nature.berkeley.edu or (916) 435-3230.

3/5 -3/9/2007 - Sudden Oak Death Science Symposium III; Hyatt Vineyard Creek
Hotel and Spa; 170 Railroad Street; Santa Rosa, CA 95401; For questions, contact
Katie Palmieri, CA Oak Mortality Task Force Public Information Officer, at:
palmieri@nature.berkeley.edu or (510) 847-5482.

4/24/07 – Free one-day Sudden Oak Death/*P. ramorum* Wildland Training Session;
Pt. Reyes National Seashore, Red Barn Classroom; 1 Bear Valley Road, Pt. Reyes
Station, CA 94956; More information, including session times, will be
forthcoming. For questions, contact Janice Alexander at:
JAlexander@co.marin.ca.us or (415) 499-3041.

5/1/07 – Free one-day Sudden Oak Death/*P. ramorum* Wildland Training Session;
Presentation Center; 19480 Bear Creek Road, Los Gatos, CA 95033; More
information, including session times, will be forthcoming. For questions, contact
Katie Palmieri at: Palmieri@nature.berkeley.edu or (916) 435-3230.

10/15 – 10/18/2007 - XVI International Plant Protection Congress 2007, Glasgow,
UK; Full details on the recently announced call for papers can be found at:
<http://www.bcpc.org/IPPC2007/Call%5Ffor%5FPapers/>. For more information,
contact Dr. Slawson, PHSI DEFRA, at: david.slawson@defra.gsi.gov.uk.