



CALIFORNIA OAK MORTALITY TASK FORCE REPORT JUNE 2008

MONITORING

On April 29th, additional foliage samples were taken for analysis from native trees and shrubs along the ditch outside of the nursery in Jackson, MS (reported in the May COMTF newsletter). Results from both isolation attempts and molecular tests on those follow-up foliage samples were negative for *P. ramorum*. Follow-up water samples collected on April 29th inside and outside the nursery perimeter also were negative for *P. ramorum*. To assure the absence of the pathogen in the natural environment, additional sampling will be conducted in the fall and following spring when conditions should be more conducive to its detection.

Follow-up plant samples taken from the adjacent nursery were also negative for *P. ramorum*; one additional soil sample, collected in mid-May, currently is being assayed. The USDA Animal and Plant Health Inspection Service (APHIS) Confirmed Nursery Protocol is underway at the facility, and is expected to be completed soon. A post eradication monitoring survey will be conducted within the nursery in the spring of 2009 and again in 2010. For more information, contact Jonathan Jones at Jonathan.M.Jones@aphis.usda.gov.

***P. ramorum* was confirmed in a landscape setting in Harris County, Texas in March**, as well as at a California nursery in April. The confirmations were made following trace-forward investigations resulting from a Southern California nursery found to have *P. ramorum*-positive *Camellia sinensis* in February. The S. CA nursery had shipped to nurseries and homeowners interstate. The positive *Camellia* sp. planted in the Texas yard was removed and destroyed as per the USDA APHIS "Official Regulatory Protocol for *Phytophthora ramorum* Detections in Landscaped Residential or Commercial Settings." All follow-up landscape soil sampling results to date at the Texas site have been negative for the pathogen. For more information, contact Jonathan Jones at Jonathan.M.Jones@aphis.usda.gov.

NURSERIES

***P. ramorum* was confirmed at one Mendocino County, CA retail nursery in May** after being self reported by the nursery owner. This latest detection brings the total number of positive CA nurseries to 12 (four producers, two wholesalers/producers, one production/retail, and five retailers). Six of the positive nurseries are located in the regulated counties of Los Angeles (3), San Diego, San Joaquin and Santa Barbara. The remaining six nurseries are located in the quarantined counties of Alameda, Contra Costa (2), Humboldt, Mendocino, and San Mateo. Six of the twelve nurseries have previously been positive for *P. ramorum*. One of the 12 nurseries has shipped plant product interstate.

As of May 23rd, the Oregon Department of Agriculture Plant Health Laboratory has processed 10,090 samples from 247 grower sites in 2008. *Phytophthora* has been detected at 63.1% of the grower sites inspected and in 9.4% of the samples collected for



testing. Compared to 2007, this represents a 16.8% increase in the number of nurseries with *Phytophthora* present and a 3.9% increase in the number of samples requiring PCR testing for *P. ramorum*. The extremely long, cool, wet spring appears to be the major factor contributing to these increases.

P. ramorum has been detected in three OR nurseries and one landscape site in 2008. At all sites, *P. ramorum* was initially detected on infected *Rhododendron*. During delimitation surveys in the nurseries, additional positives were found in the soil and potting media at one nursery and in the cull pile, soil beneath an infected block, and in a block of *Arctostaphylos uva-ursi* at the second nursery. No additional positives have been found in the third nursery, although soil and media samples are still pending. The delimitation surveys for the landscape site are underway. The infected plant at the landscape site was purchased from a positive Oregon nursery earlier this year.

FUNDING

The USDA-FS, Pacific Southwest Research Station (PSW) Sudden Oak Death/*P. ramorum* Research program is awarding approximately \$1.5 million for 2008 research projects. The funded projects are being carried out at 15 research institutions in seven states, the United Kingdom, and Germany. To view funding for the 2008 PSW Sudden Oak Death/*P. ramorum* program, go to: http://www.fs.fed.us/psw/programs/sod/funding/awards_08.shtml. For more information on the program and funded research, contact Susan Frankel at 510-559-6472 or sfrankel@fs.fed.us.

RESEARCH

Hansen, E.M. 2008. Alien forest pathogens: *Phytophthora* species are changing world forests. Boreal Env. Res. 13:33-41.

Abstract: *Phytophthora* is a genus of aquatic plant pathogens well known as disease agents in agriculture and forestry. They are water molds, Oomycetes, with swimming zoospores and thick-walled resting spores. Many species are benign in coevolved plant communities, but given the opportunity of introduction to new hosts in new environments, new opportunities for dispersal, or unexpected sexual recombination, they are causing dramatic epidemics in forests around the world. *Phytophthora ramorum* (cause of sudden oak death in western North America and also damaging in Europe) provides a current example, dramatically illustrating the potential of these pathogens for rapid ecological (and economic) damage. *Phytophthora cinnamomi* and *P. lateralis* are also alien to Europe and North America but with different epidemiological strategies. By comparing these three related pathogens and the different consequences of their invasions, some predictions for the future of our forests are possible.

Hansen, E.M.; Kanaskie, A.; Prospero, S.; McWilliams, M.; Goheen, E.M.; Osterbauer, N.; Reeser, P.; and Sutton, W. 2008. Epidemiology of *Phytophthora ramorum* in Oregon tanoak forests. Can. J. For. Res. 38:1133-1143. DOI: 10.1139/X07-217.



Abstract: We followed the local intensification and dispersal of *Phytophthora ramorum* Werres, De Cock, Man In't Veld in Oregon tanoak (*Lithocarpus densiflorus* (Hook Arn.) Rehd.) forests from its initial detection in 2001 through 2006, coincident with a continuing eradication effort. The initial infested area included nine scattered sites below 400 m elevation, close to the Pacific Ocean near Brookings, Oregon. In subsequent years, one-half of new infections were within 122 m of a previous infection, and 79% of the newly detected trees occurred within 300 m of a previously identified tree. Dispersal up to 4 km was occasionally recorded. Initial infection occurred in the upper crowns of tanoak trees. The pathogen was recovered in rainwater collected beneath diseased tanoak trees in every month from November 2006 through October 2007. Twenty-four multilocus microsatellite genotypes were identified among 272 *P. ramorum* isolates collected from Curry County. Genotypic analysis provided independent estimates of time of origin of the Oregon infestation, its clustered distribution, and dispersal distances. In all sampling years, 60%-71% of the isolates belonged to the same multilocus genotype. In 2001, 12 genotypes were detected and new genotypes were identified in each of the subsequent years, but all isolates belonged to the same clonal lineage. Knowledge of local intensification of the disease and long-distance dispersal should inform both Oregon eradication efforts and national quarantine regulations.

Park, J.; Park, B.; Veeraraghavan, N.; Jung, K.; Lee, Y.-H.; Blair, J.E.; Geiser, D.M.; Isard, S.; Mansfield, M.A.; Nikolaeva, E.; Park, S.-Y.; Russo, J.; Kim, S.H.; Greene, M.; Ivors, K.L.; Balci, Y.; Peiman, M.; Erwin, D.C.; Coffey, M.D.; Rossman, A.; Farr, D.; Cline, E.; Grünwald, N.J.; Luster, D.G.; Schrandt, J.; Martin, F.; Ribeiro, O.K.; Makalowska, I.; and Kang, S. 2008. *Phytophthora* Database: A forensic database supporting the identification and monitoring of *Phytophthora*. Plant Dis. 92:966-972.

Abstract: *Phytophthora* spp. represent a serious threat to agricultural and ecological systems. Many novel *Phytophthora* spp. have been reported in recent years, which is indicative of our limited understanding of the ecology and diversity of *Phytophthora* spp. in nature. Systematic cataloging of genotypic and phenotypic information on isolates of previously described species serves as a baseline for identification, classification, and risk assessment of new *Phytophthora* isolates. The *Phytophthora* Database (PD) was established to catalog such data in a web-accessible and searchable format. To support the identification of new *Phytophthora* isolates via comparison of their sequences at one or more loci with the corresponding sequences derived from the isolates archived in the PD, we generated and deposited sequence data from more than 1,500 isolates representing the known diversity in the genus. Data search and analysis tools in the PD include BLAST, Phyloviewer (a program for building phylogenetic trees using sequences of selected isolates), and Virtual Gel (a program for generating expected restriction patterns for given sequences). The PD also provides a customized means of storing and sharing data via the web. The PD serves as a model that easily can be adopted to develop databases for other important pathogen groups.



LEARNING CURVE

While there is NO known cure for Sudden Oak Death, there is one preventative phosphonate treatment currently registered for use in California on individual tanoaks and susceptible oaks (coast live oak, Shreve's oak, CA black oak, and canyon live oak). Trees under consideration for treatment should be within a few miles of a known infestation. The treatment, called Agri-Fos[®], can either be injected into the tree or it can be combined with the surfactant Pentra-Bark[™] and applied to the trunk of the tree.

When deciding to inject or spray, there are pros and cons for each application method that should be considered. Benefits to choosing injection include: it is the most environmentally friendly as the material is released directly into the tree; the surfactant is not needed; and moss removal on the tree is not necessary. Challenges faced with injections include: the treatment process is more complex as the injection must be inserted to the right depth, and done on favorable weather days; the trunk of the candidate tree must be without flaws; and injection sites are drilled, creating wounds in the tree. Benefits to choosing spray applications include: treatments are easily accomplished with a sprayer and protective gear and can be done in all weather conditions but rain and wind; tree structure is not a concern; and there is no wounding of the tree. Challenges to consider before choosing to spray include: both the Agri-Fos[®] and Pentra-Bark[™] products are needed; surrounding plants may be damaged/burned if the mixture is exposed to them; and moss must be removed from candidate trees before application for the product to be adequately absorbed.

If choosing to use the injection method for preventative treatment, necessary equipment includes protective equipment, a drill, positive-pressure injectors, and Agri-Fos[®]. Drilling must be done into the xylem of the tree and must be quickly followed by the insertion of the injector. Positive pressure must then be applied to allow the material to be absorbed into the tree. The rate at which the material will be absorbed will depend upon the weather and time of year, so try to inject on mild days whenever possible for better absorption. The number of injections per tree is based upon the circumference of the tree (see the product label for details). Injections should be staggered around the tree trunk.

If choosing to use the spray application method for preventative treatment, necessary equipment includes a sprayer; Agri-Fos[®]; Pentra-Bark[™]; and protective eyewear, gloves, and clothing. Before applying the mixture, put on protective gear, remove all moss from the trunk of the tree, and also be sure to tarp any surrounding plants. Spraying should only be done when it is not raining and there is no wind. When applying the material (per label mixture recommendations), cover the trunk of the tree from the base up to 12 – 15 feet until the material begins to drip.

Both application methods take four to six weeks for the material to be assimilated by the plant. So, it is recommended that initial applications be applied either in the fall after temperatures drop (usually November to early December) or in the spring after new leaves emerge (late March to April). The first year the treatments should be applied once



in the fall and repeated again in the spring or vice versa. Every year thereafter the treatment should be administered in the fall (note: if the first treatment is administered in the fall and the second in the spring, the first follow-up annual treatment should begin in 1.5 years in the fall and then annually in the fall thereafter).

Always check the label before making any pesticide application. For labels and material safety data sheets on Agri-Fos[®] and Pentra-Bark[™], go to the Garbelotto UC Berkeley Forest Pathology and Mycology laboratory website at:

<http://www.cnr.berkeley.edu/garbelotto/downloads/agrifospentrabarklabel.pdf>.

This treatment information is a summary of the treatment training sessions being offered by Matteo Garbelotto at the UC Berkeley campus (see Calendar of Events listings below).

NOTE: The recommendations above are based on the best science currently available. Studies conducted on the use of Agri-Fos[®] and Pentra-Bark[™] against Sudden Oak Death are relatively new and ongoing; therefore recommendations are subject to change. Reference herein to these specific commercial products does not constitute or imply its favoring by the COMTF.

MEETINGS AND TRAINING SESSIONS

Sudden Oak Death (SOD) Blitzes are under way this spring. To date, Blitzes have been conducted at the Santa Lucia Preserve as well as in Woodside and Portola Valley. Blitzes yet to come include the East Bay's Tilden, Wildcat Canyon, Redwood, and Briones Regional Parks on June 7 – 8, Mendocino County June 13 – 15, and Humboldt County June 14 – 15. Led by Matteo Garbelotto, UC Berkeley, and supported by the California Oak Mortality Task Force (COMTF) and participating UC Cooperative Extension Offices and County Departments of Agriculture, the Blitzes are intended to raise awareness of SOD as well as to determine the locations and boundaries of the disease in each of the areas.

SOD Blitz participants will be trained to identify disease symptoms, correctly sample symptomatic plants, and document sample locations. Samples will be collected at designated locations for each particular Blitz, and 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 for each participating location. The maps developed for Mendocino and Humboldt Counties will then be used for assisting in the development of comprehensive management plans with cooperating landowners.

Free Sudden Oak Death preventative treatment training sessions are being held on the UC-Berkeley campus 6/11 and 7/9. For additional details, see the Calendar of Events below.

**REGULATIONS**

Correction to May Newsletter Entry Regarding PCR Diagnostics: In addition to accepting current conventional (nested-PCR and other multiplex) and Real-time PCR assays, USDA APHIS will also be accepting paired ITS and Elicitin/5.8S Real-time PCR assays. For more information, go to USDA APHIS Program Updates at: http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/downloads/pdf_files/sproda-2008-19.pdf.

RELATED RESEARCH

Fry, William. 2008. Plant diseases that changed the world, *Phytophthora infestans*: the plant (and Rgene) destroyer. *Molecular Plant Pathology* 9(3), 385–402. DOI: 10.1111/J.1364-3703.2007.00465.X.

Tyler, B.M. 2007. *Phytophthora sojae*: root rot pathogen of soybean and model oomycete. *Molecular Plant Pathology* 8(1), 1–8. DOI: 10.1111/J.1364-3703.2006.00373.X.

RESOURCES

Bennett, M. and Shaw, D. 2008. Diseases and Insect Pests of Pacific Madrone. Oregon State University Extension Service, EC 1619-E. Online at: <http://extension.oregonstate.edu/catalog/pdf/ec/ec1619-e.pdf>.

PERSONNEL

Philip Berger has been selected as the USDA APHIS Plant Protection and Quarantine (PPQ) Director of Plant Health Science and Technology (Center). As of May 11, 2008, Phil is responsible for providing national leadership in the overall planning, coordination, and direction of development and transfer of technology used in PPQ's plant health programs.

Phil's Federal career began in 2003 when he was selected as PPQ's National Science Program Leader (NSPL) for Molecular Diagnostics and Biotechnology at the Center. More recently, he served as the Acting Associate Director for the Center and the Acting CPHST Director since October of 2007. Phil can be reached at philip.h.berger@aphis.usda.gov or (919) 855-7414.

CALENDAR OF EVENTS

- 6/7 - East Bay SOD Blitz Training; Trudeau Center; 11500 Skyline Blvd.;** Oakland; 10:00 – 11:30 a.m. (first training session); 11:30 a.m. – 1:00 p.m. (alternate training session); This is a FREE class. For more information, contact Sue Rosenthal at (510) 496-6016 or rosacalifornica@earthlink.net.
- 6/11 - Sudden Oak Death (SOD) Treatment Workshop; Tolman Hall "Portico," UC Berkeley Campus;** 1 – 3 p.m.; Pre-registration is required. This class is free. To register, email SODtreatment@nature.berkeley.edu, and provide your name, phone number, affiliation (if applicable), and the date for which you are



registering. For more information, contact Katie Palmieri at (510) 847-5482 or palmieri@nature.berkeley.edu.

6/13 - Mendocino County SOD Blitz Training; Mendocino County

Fairgrounds "The Dining Room;" 14400 Highway 128; Boonville; 5:30 – 7:30 p.m.; This is a FREE class. For more information, contact Tony Linegar at (707) 463-4208 or linegart@co.mendocino.ca.us.

6/14 - Humboldt County SOD Blitz Training; Beginnings; 5 Cemetery Road

Briceland CA; 10:00 a.m. – 1:00 p.m.; Pre-registration is requested for this FREE class by 6/11. To pre-register, call the Mattole Restoration Council's Whitethorn office at (707) 986-1078. For more information, including directions, contact Matt Cocking at (707)986-1078 or Yana Valachovic at (707) 445-7351.

7/9 - SOD Treatment Workshop; Tolman Hall "Portico," UC Berkeley Campus;

1 – 3 p.m.; Pre-registration is required. This class is free. For more information, see the 6/11 listing above.