CALIFORNIA OAK MORTALITY TASK FORCE REPORT
DECEMBER 2007

***Note*: The COMTF report is produced 11 months a year. There will be no report in January 2008. The next report will be issued in the first week of February 2008.**

RESEARCH

Belbahri, L.; Calmin, G.; Wagner, S.; Moralejo, E.; Woodward, S.; and Lefort, F. 2007. Specific hybridization real-time PCR probes for *Phytophthora ramorum* detection and diagnosis. Forest Pathology 37 403–408. DOI: 10.1111/j.1439-0329.2007.00517.x.

Sudden Oak Death, caused by *Phytophthora ramorum*, poses a serious threat to native American oaks, and is also present in Europe where it has been isolated from numerous European ornamental plant nurseries. Its proven aggressiveness against plants in the Fagaceae and Ericaceae and the damage it has caused in North America have lead to it being assigned quarantine status. The timely and accurate detection of *P. ramorum* is a critical aid in the study of the epidemiology and biology of this pathogen. As a regulated organism, the availability of a sensitive and reliable assay is essential when attempting to achieve early detection of the pathogen. In this work, new specific hybridization probes for a real-time PCR amplification method were found to be rapid, robust and labour-saving, and proved suitable for routine use in a molecular diagnostic laboratory.

Ockels, Frances S.; Eyles, Alieta; McPherson, Brice A.; Wood, David L.; and Pierluigi Bonello. 2007. Phenolic Chemistry of Coast Live Oak Response to *Phytophthora ramorum* Infection. J Chem Ecol 33:1721–1732. DOI: 10.1007/s10886-007-9332-z.

Abstract: Since the mid 1990s, *Phytophthora ramorum* has been responsible for the widespread mortality of tanoaks, as well as several oak species throughout California and Oregon forests. However, not all trees die, even in areas with high disease pressure, suggesting that some trees may be resistant to the pathogen. In this study, the chemical basis of host resistance was investigated. Three field experiments were carried out in California between December 2004 and September 2005. The levels of nine phenolic compounds (gallic acid, catechin, tyrosol, a tyrosol derivative, ellagic acid, and four ellagic acid derivatives) extracted from the phloem of trees that had been either artificially inoculated with *P. ramorum* or trees putatively infected with *P. ramorum* (based on canker symptoms) were quantified by high-performance liquid chromatography (HPLC). Significant differences in phenolic profiles were found between phloem sampled from the active margins of cankers, healthy phloem from asymptomatic trees, and phloem sampled 60 cm away from canker sites, although the magnitude and direction of the responses was not consistent across all experiments. Concentrations of gallic acid, tyrosol, and ellagic acid showed the greatest differences in these different tissues, but varied considerably across treatments. Gallic acid and tyrosol were tested in in vitro bioassays and showed strong dose-dependent inhibitory effects against *P. ramorum*, *P. cinnamomi*, *P. citricola*, and *P. citrophthora*. These results suggest that phloem chemistry varies in response to pathogen infection in California coast live oak populations and that changes in phloem chemistry may be related to apparently resistant phenotypes observed in the field.

Parke, J. L.; Oh, E.; Voelker, S.; Hansen, E.M.; Buckles, G.; and Lachenbruch, B. 2007. *Phytophthora ramorum* colonizes tanoak xylem and is associated with reduced stem water transport. Phytopathology 97:1558-1567.

Abstract: Isolation, detection with diagnostic polymerase chain reaction (PCR), and microscopy demonstrated the presence of *Phytophthora ramorum* in the sapwood of mature, naturally infected tanoak (*Lithocarpus densiflorus*) trees. The pathogen was strongly associated with discolored sapwood ($P < 0.001$), and was recovered or detected from 83% of discolored sapwood tissue samples. Hyphae were abundant in the xylem vessels, ray parenchyma, and fiber tracheids. Chlamydospores were observed in the vessels. Studies of log inoculation indicated that *P. ramorum* readily colonized sapwood from inoculum placed in the bark, cambium, or sapwood. After 8 weeks, radial spread of *P. ramorum* in sapwood averaged 3.0 to 3.3 cm and axial spread averaged 12.4 to 18.8 cm. A field study was conducted to determine if trees with infected xylem had reduced sap flux and reduced specific conductivity relative to noninfected control trees. Sap flux was monitored with heat-diffusion sensors and tissue samples near the sensors were subsequently tested for *P. ramorum.* Adjacent wood sections were excised and specific conductivity measured. Both midday sap flux and specific conductivity were significantly reduced in infected trees versus noninfected control trees. Vessel diameter distributions did not differ significantly among the two treatments, but tyloses were more abundant in infected than in noninfected trees. Implications for pathogenesis, symptomology, and epidemiology are discussed.

Shishkoff, N. 2007. Susceptibility of some *Lilac* cultivars and other members of the Oleaceae to *Phytophthora ramorum*. Online. Plant Health Progress DOI: 10.1094/PHP-2007-1101-02-RS.

Abstract: Lilac is a host of *Phytophthora ramorum*, but differences in host susceptibility of lilac cultivars and related genera have not been fully studied. This paper describes the symptoms on lilac and some other plants in the Oleaceae (*Forsythia*, *Fraxinus*, *Ligustrum*, and *Abeliophyllum*) and analyzes their relative susceptibility. Lilacs varied somewhat in susceptibility, with *Syringa* x *josiflexa* 'James MacFarlane' showing no symptoms and *S.* x *prestoniae* 'Alexander's pink' very few, but most cultivars developed large dark leaf lesions and suffered defoliation of heavily infected leaves. *Fraxinus* and *Ligustrum* were somewhat less susceptible than most lilac cultivars. The pathogen could sometimes be isolated from buds, but twig die-back was not observed. One month after the roots of *Syringa*, *Abeliophyllum*, *Forsythia*, and *Ligustrum* were inoculated, roots remained asymptomatic, but the pathogen could be recovered from washed or surface sterilized root pieces of all genera tested except *Ligustrum*.

OTHER RESEARCH OF INTEREST

***Phytophthora alni* subsp. *uniformis* (PAU) has been found in Alaska during riparian *Phytophthora* surveys.** It was confirmed November 2007 by Dr. Gerard Adams, Michigan State University. This is not the highly pathogenic *P. alni* subsp. *alni* (PAA) found in Europe killing alder. PAU is thought to have hybridized with *P. alni* subsp. *multiformis* to form the highly pathogenic PAA. The Alaskan *P. alni* subsp. *uniformis* findings were made in two remote, unmanaged locations hundreds of miles from one another. To date, no collar or root symptoms of *P. alni* have been

identified with the findings, and inspections for other symptoms of *Phytophthora* disease have been negative. While not completely understood, it is thought that PAU may benignly co-exist with alder in Alaska and has not previously been noted due to the lack of surveys such as those conducted in 2007. PAU is the only variant of *P. alni* found in Alaska to date. This is the first finding of any of the *P. alni* variants in North America.

The North American Forestry Commission has noted that *P. alni,* especially PAA, poses significant phytosanitary concerns for those countries where the pathogen does not yet occur. Due to the extensive stands of alder across North America and the presumption that PAA does not presently occur in the United States, the introduction of this pathogen has been considered highly undesirable.

To review a briefing paper on this finding, go to http://nature.berkeley.edu/comtf/pdf/Alaska_Briefing_Alder_Phytophthora_Nov18.pdf. For more information, contact Lori Trummer, USDA Forest Service, Forest Health Protection; Anchorage, Alaska at ltrummer@fs.fed.us.

Saavedra, A.; Hansen, E.M.; and Goheen, D.J. 2007. *Phytophthora cambivora* in Oregon and its pathogenicity to *Chrysolepis chrysophylla*. Forest Pathology 37 (2007) 409–419. DOI: 10.1111/j.1439-0329.2007.00515.x.

A new canker disease causing mortality of golden chinquapin trees [*Chrysolepis chrysophylla* (Dougl.) Hjelmqvist], in Oregon was recently observed. Most of the symptomatic or dead trees were located near roads. The cankers on the lower boles of trees are similar to those caused by species of *Phytophthora* on other trees in western North America. The cankers in the inner bark were reddish-orange in color and extended upward from necrotic roots. *Phytophthora cambivora* (Petri) Buisman was isolated from the cankers; identity was confirmed by morphological comparison with known isolates and internal transcribed spacer sequence analysis. Pathogenicity was confirmed by inoculation of chinquapin seedlings and mature trees. Seven of nine isolates from chinquapin were A2 mating type; 27 of 28 isolates from other hosts in Oregon and Washington were A1 mating type.

COUNTY UPDATE

Sonoma County Sudden Oak Death (SOD)-related tanoak and coast live oak mortality has dramatically increased over the last two years, with 23% of the County's at risk forests currently infested. Of the 75,000 acres impacted by SOD, 39% is new die-off mapped in 2007.

Focusing on disease biology, spread, and treatment, as well as potential fire hazards associated with SOD mortality, Sonoma's two Sudden Oak Death Program coordinators facilitated 21 community meetings, reaching over 900 residents in the past year. Media coverage has also been extensive with 14 local print and radio stories since March 2007. Additionally, SOD funding issues have been incorporated into the Sonoma County 2008 Legislative Program, meaning the County will support SOD funding legislation at the state level.

In early January, the coordinators will present a Sudden Oak Death Strategic Response Plan to the County Board of Supervisors. This plan presents the current and possible future impacts of SOD on land management agencies within the County

and lists estimated costs of mitigation activities over the next few years. Funding needs for the first year are estimated at $3.3 million: $2 million for fire fuel mitigation activities and $1.3 million for tree removals and treatment, education and outreach, developing a hardwood fuel model, mapping the infestation, and funds for fire departments. The strategic plan is intended to bring attention to the increase in pathogen spread, the expense of removing hazard trees, and the potential for increased fire risks associated with heavy mortality.

Fire Safe Sonoma's "Sudden Oak Death Mitigation and Defensible Space Project," funded by a grant from the Bureau of Land Management, has recently gotten underway and will be active until May 2008. Funds will be used to help homeowners in SOD-impacted areas with costs related to creating or maintaining 100 feet of defensible space. Fire Safe Sonoma anticipates that the program will remove a tremendous amount of fire fuels as well as provide a model for administration of SOD tree mitigation funds.

For more information on Sonoma County's SOD program, contact Lisa Bell at lkbell@ucdavis.edu, or Caerleon Safford at csafford@sonoma-county.org.

NURSERIES

To date in 2007, there have been a total of 21 positive nursery finds, as of October 3. The states with positive finds/detections are CA(7), OR(2), WA(7), FL(1), GA(3), and MS(1). Of the 7 positive CA nurseries identified this year, 1 was a repeat confirmation producer, 3 were repeat confirmation retailers, 2 were producers (not repeats), and 1 was a retailer (not repeat).

FUNDING

The USDA Forest Service, State and Private Forestry, Forest Health Protection program has issued their 2008 *P. ramorum* Request for Proposals (RFP). Approximately $600,000 is expected to be available this year. Proposals should focus on *P. ramorum* monitoring and management efforts, including activities such as detection, outreach, and containment. Multi-year, collaborative projects are encouraged and should range from $5,000 and $100,000 per year. Proposals must be submitted by 4:00 p.m. on 2/15/08. Grants need to be matched dollar for dollar with non-federal funds or in-kind work. For a copy of the Pacific Southwest Region, Forest Health Protection announcement, contact Phil Cannon, Regional Forest Pathologist, at: pcannon@fs.fed.us or (707) 562-8913.

The USDA Forest Service, Pacific Southwest Research Station will issue a Request for *P. ramorum* / Sudden Oak Death Research Proposals in January 2008. For more information on the research RFP, contact Susan Frankel at sfrankel@fs.fed.us.

PERSONNEL

Jim Jensen will be assisting Janice Alexander as the Sudden Oak Death Outreach Assistant in the UC Cooperative Extension, Marin office. He recently graduated from Cal Poly, San Luis Obispo with a degree in Forestry and Natural Resources Management and a minor in Range. Jim was born and raised in Marin County and continues to work part time on his family's ranch in Tomales

as well as for the Pt. Reyes National Seashore's Fire Management program. Jim is looking forward to working with the Extension staff and the COMTF on SOD education and outreach. He can be reached at 415-499-3281 and jjensen@co.marin.ca.us.

CALENDAR OF EVENTS

12/12 – Free Sudden Oak Death Professional Treatment Training Workshop; Huddart County Park; 1100 Kings Mountain Rd.; Woodside; 10:00 a.m. – 12:00 p.m.; Pre-registration is required and space is limited to 100 attendees. To register, call (650) 726-9059 x 101 or email wrotchstein@ucdavis.edu. Please provide your name and affiliation (company or organization). DPR and ISA credits have been applied for and are expected to be available.

04/16 – California Oak Mortality Task Force meeting; Marin Center Showcase Theatre. Please save this date for the next COMTF meeting. More details and registration will be available in early 2008.