CALIFORNIA OAK MORTALITY TASK FORCE REPORT
NOVEMBER 2009

NURSERIES

**A Montgomery County, Maryland residence was identified on 9/18/09 as having a *P. ramorum*-positive witch hazel (*Hamamelis intermedia* 'Jelena') plant as a result of a trace-forward investigation from a Lane County, Oregon nursery found *P. ramorum*-positive in April 2009. Following the Oregon confirmation, the USDA Animal and Plant Health Inspection Service (APHIS) notified the Maryland Department of Agriculture (MDA) on June 2, 2009 that the positive Oregon nursery had shipped plant material directly to Maryland residents. MDA then notified each of the 28 Maryland households that had received plants and provided them with sample kits to screen for the pathogen. To date, only the one positive witch hazel plant has been identified. MDA has been contacted by 16 of the households, and nine of them have sent in a total of 24 samples. The Department is following up with the remaining 12 test kit recipients to obtain samples from them.

REGULATORY PROGRAM UPDATE

The USDA Animal and Plant Health Inspection Service (APHIS) has restructured its Emergency and Domestic program staff into focused teams that include appropriate subject matter experts. The new *Phytophthora ramorum* team comprises Scott Pfister, team director; Prakash Hebbar, National Program Manager; Jonathan Jones, team member; and Dave Kaplan, team member. In his new role, Pfister will provide overall direction and guidance in program delivery and serve as the national program representative. Hebbar, in his new role as National Program Manager, works directly with Pfister and provides technical expertise, policy and budget consultation, program coordination, and facilitation of stakeholder communication and collaboration. As team members, Jones and Kaplan will play an advisory role. Pfister can be contacted via email at Scott.E.Pfister@aphis.usda.gov and Hebbar at prakash.hebbar@aphis.usda.gov.

FUNDING

The USDA Forest Service, Pacific Southwest Region, State and Private Forestry, Forest Health Protection program has issued its 2010 *P. ramorum* Request for Proposals (RFP) for management projects. Approximately $500,000 in grants is available in federal fiscal year 2010. Proposals should focus on: management activities that could limit the impact of Sudden Oak Death in California or SW Oregon, pathology activities that will provide new information on the spread of *P. ramorum*, and extension activities to promote relevant information on this pathogen to a broad spectrum of interested stakeholders. In general, proposals should be for grants of between $5,000 and $100,000 per year. Multi-year, collaborative projects are encouraged. The submission deadline is January 22, 2010. For a copy of the announcement or for questions, contact Phil Cannon at: pcannon@fs.fed.us or (707) 562-8913.

MANAGEMENT

In a collaborative effort, California State Parks and CalFire are removing infected and symptomatic tanoaks from the MacKerricher State Park campground. The project is a proactive and precautionary measure intended to help reduce the spread of Sudden Oak Death in the area, particularly before the wet season begins. The Park infestation (four miles north of Fort Bragg in Mendocino County) was first identified in spring 2009, and is the first known occurrence of the disease along the Northern Mendocino coast.

Once the trees are cut by California Conservation Corps crews, the boles, branches, and leaves will be burned in an air curtain incinerator. The incinerator produces intense heat that rapidly consumes the wood and greatly reduces the level of smoke emissions. Cutting began on 10/28 and is expected to continue through the first week of November. Burning is scheduled to begin on 11/2 and continue through 11/20. The campground is near coastal bluffs; consequently, tanoaks adjacent to the infected site will not be removed due to concerns over wind firmness of the remnant stand, should too many trees be removed. View photos of the fall 2009 work. Other projected management actions for the site include the use of Agri-Fos® on selected tanoak surrounding the site as well as planting Bishop pine seedlings as part of a site rehabilitation effort. For more information, contact Jack Marshall at Jack.Marshall@fire.ca.gov.

MONITORING

***P. ramorum* has been detected in a new watershed in Humboldt County. The** pathogen was confirmed by the UC Davis Rizzo Lab from symptomatic *Rhododendron* leaf baits deployed in May in Blue Slide Creek, a tributary to the Mattole River with headwaters approximately 9 km (5.6 miles) northwest of the community of Redway. (See Map of Infestation Proximity.) Blue Slide Creek is located at the southwestern boundary of the watershed; adjacent creeks that flow to the South Fork Eel River have been known to be infested for some time. UCCE Humboldt and the Mattole Restoration Council have been collaborating with the Rizzo Lab to monitor the main stem of the river, along with several tributaries throughout the watershed, for the past three years. Portions of the Mattole River watershed, which encompasses concentrations of small, private parcels as well as eastern sides of the 68,000-acre King Range National Conservation Area, contain very dense stands of both California bay laurel and tanoak, making spread of *P. ramorum* a major regional concern. No infected vegetation has been found to date. The collaborators will continue intensive monitoring of area watercourses as they move to study potential control options and intensify education and outreach to area landowners. For more information, contact Yana Valachovic or Chris Lee at UCCE Humboldt: yvala@ucdavis.edu, cale@ucdavis.edu, or (707) 445-7351.

The 2009 *P. ramorum* Survey for the Northern Sierra Nevada was completed in September. The stream-based *P. ramorum* detection survey was conducted in Butte, Yuba, Nevada, Placer, and El Dorado Counties in northern California. A total of 20 watercourse sites were surveyed during May and June using rhododendron leaves as bait for *Phytophthora* spp. This produced 39 sets of baits that were cultured for the presence of *P. ramorum*. The pathogen was not detected in any of the samples. Other

Phytophthora spp. were recovered, but not identified. For more information, contact Don Owen at Don.Owen@fire.ca.gov.

RESEARCH

Denman, S.; Kirk, S.A.; Moralejo, E.; and Webber, J.F. 2009. *Phytophthora ramorum* and *Phytophthora kernoviae* on naturally infected asymptomatic foliage. Forest Research. Journal compilation. *OEPP/EPPO Bulletin* 39. Pages 105–111.

Abstract: *Phytophthora ramorum* and *Phytophthora kernoviae* are recently discovered invasive *Phytophthoras* causing leaf necrosis and shoot tip dieback mostly on ornamental and forest understory species, but also cause bleeding cankers on stems of a wide range of tree species. Sporulation occurs only on infected shoots or fruits and foliage so foliar hosts are central to the disease epidemiology. In field trials to assess infection in trap plants exposed to natural inoculum of *P. ramorum* and *P. kernoviae* on rhododendron in south west England, it was discovered that leaves of the trap plants (*Rhododendron* 'Cunninghams White') and holm oak (*Quercus ilex*) were asymptomatically infected and supported sporulation of both pathogens. More than half the rhododendron trap plants exposed to inoculum of *P. kernoviae* became infected compared with approximately a third of those exposed to *P. ramorum* in a natural situation. Approximately one third of the infections were detected from asymptomatic foliage for both pathogens. The significance of these findings for plant health regulation based on visual inspection as a measure to prevent introduction and dissemination of both these pathogens is explored and research gaps identified.

DiLeo, M. V., Bostock, R. M., and Rizzo, D. M. 2009. *Phytophthora ramorum* does not cause physiologically significant systemic injury to California bay laurel, its primary reservoir host. Phytopathology 99:1307-1311.

Abstract: California bay laurel trees (*Umbellularia californica*) play a crucial role in the reproduction and survival of *Phytophthora ramorum* in coastal California forests by supporting sporulation during the rainy season and by providing a means for the pathogen to survive the dry, Mediterranean summer. While bay laurel is thus critical to the epidemiology of sudden oak death and other *P. ramorum* diseases in California, the relatively minor symptoms observed on this reservoir host suggest that it may not sustain ecologically significant injury itself. The long-term role that *P. ramorum* will play in California forests will depend in part on the extent to which this pathogen decreases the ecological fitness of bay laurel. Despite the importance of this question, no study has yet investigated in detail the physiological impact that ramorum blight imposes on bay laurel. This experimental study quantifies the impact that *P. ramorum* has on artificially inoculated bay laurel seedlings with measurements that integrate the full injury that infection with an oomycete may cause: photosynthetic efficiency, total photosynthetic area, and growth. Leaf area and leaf mass were not impacted significantly by infection of *P. ramorum*. Photosynthetic efficiency was mildly depressed in symptomatic, but not asymptomatic leaves, despite unnaturally high levels of necrosis that were imposed on the seedlings. These results demonstrate that bay laurel trees suffer only minor injury

from ramorum blight beyond visible necrotic symptoms. Consequently, it is highly likely that bay laurel will continue to be widely available as a host for *P. ramorum* in California forests, which has long-term implications for the composition of these forests.

Sutton, W., Hansen, E. M., Reeser, P. W., and Kanaskie, A. 2009. Stream monitoring for detection of *Phytophthora ramorum* in Oregon tanoak forests. Plant Disease 93:1182-1186.

Abstract: Stream monitoring using leaf baits for early detection of *Phytophthora ramorum* has been an important part of the Oregon Sudden Oak Death (SOD) program since 2002. Sixty-four streams in and near the Oregon quarantine area in the southwest corner of the state were monitored in 2008. Leaves of rhododendron (*Rhododendron macrophyllum*) and tanoak (*Lithocarpus densiflorus*) were placed in mesh bags, and bags were floated in streams. Leaf baits were exchanged every 2 weeks throughout the year. Leaves were assayed by isolation on selective medium and by multiplex rDNA internal transcribed spacer polymerase chain reaction (ITS PCR). The two methods gave comparable results, but multiplex PCR was more sensitive. *P. ramorum* was regularly recovered at all seasons of the year from streams draining infested sites 5 years after eradication treatment. In streams with lower inoculum densities, recovery was much higher in summer than in winter. *P. ramorum* was isolated from streams in 23 watersheds. When *P. ramorum* was detected, intensive ground surveys located infected tanoaks or other host plants an average of 306 m upstream from the bait station. *P. ramorum* was isolated from stream baits up to 1,091 m from the probable inoculum source.

FEATURE STORY

***Annulohypoxylon thouarsianum,* a new name for *Hypoxylon thouarsianum* -** The wood decay fungus *Hypoxylon thouarsianum* (Léveillé) Lloyd, which commonly forms black, rounded fruiting bodies on the trunks of SOD-affected oaks and tanoaks, has recently been reassigned to the new genus *Annulohypoxylon.* The new scientific name for this fungus is *Annulohypoxylon thouarsianum* (Léveillé) Y.-M. Ju, J.D. Rogers & H.-M. Hsieh.

The genus *Hypoxylon* has a tortuous history, but was broadly redefined by J.H. Miller initially in 1928 and later in 1961 to include a somewhat heterogeneous variety of taxa. In subsequent revisions of the genus, many of the species were assigned to other genera. By 1996, *Hypoxylon* had been pared down to two sections – *Hypoxylon* and *Annulata* – which were recognized as separate based on three distinct morphological characteristics. Since 2000, several molecular studies of *Hypoxylon* and closely related taxa have been interpreted to suggest that further reassignment of the species in this genus was in order. In 2005, Hsieh, Ju, and Rogers suggested that section *Annulata* should be segregated from *Hypoxylon* into a new genus based on both molecular data and some morphological differences. The new genus, *Annulohypoxylon*, is equivalent to *Hypoxylon* section *Annulata* (sensu Ju and Rogers, 1996).

A. thourasianum is a sapwood-decaying fungus that is very commonly associated with *P. ramorum* cankers. The fruiting bodies that emerge through the bark develop after the fungus has already caused significant decay of the underlying sapwood. The fruiting bodies are initially rounded and covered with a dark, glossy membrane, which ruptures to reveal greenish asexual spores beneath. The fruiting body continues to expand and forms a hard, charcoal-like hemisphere 1-4 cm in diameter. This structure houses a large number of flask-like perithecia in which sexual spores (ascospores) are formed. The opening of each perithicium is surrounded by a raised, ring-like (annulate) disk (hence *Annulohypoxylon*). These discs are visible as fine bumps on the surface of the mature fruiting body.

In connection with Sudden Oak Death, *A. thourasianum* functions as an opportunistic secondary pathogen. As has been seen with other *Hypoxylon* spp. (broad sense), *A. thourasianum* is thought to be present as limited inactive infections in the bark of healthy oaks, and may actually grow endophytically to a limited degree, but without causing disease. When the host tissue is damaged or severely stressed, *A. thourasianum* begins to actively decay the sapwood, disrupting water flow in the trunk, and accelerating tree decline. Extensive sapwood decay caused by *A. thourasianum*, especially in smaller stems, can cause trunks to fail.

RESOURCES

USDA APHIS has posted the "*Phytophthora ramorum* Program 2009 3rd Quarter Summary" to its website (www.aphis.usda.gov/plant_health/plant_pest_info/pram). The document includes a comprehensive summary of nursery and landscape detections; program goals; a detailed accounting of 2009 detections; and updates on protocols, Federal Orders, regulations, diagnostics, the website, and new hosts.

PERSONNEL

Dr. Prakash Hebbar is the new *P. ramorum* National Program Manager. Prior to his appointment, he worked in the private sector under a public-private partnership supported by the USDA Agricultural Research Service's Sustainable Perennial Crops Laboratory, managing a global integrated pest management (IPM) project for cocoa pests and diseases in Latin America, West Africa, and Asia. He has 30 years of experience in research and program management, including experience in cereal microbiology; the biological control of fungal diseases of cereal, oil seed, and perennial crops; and IPM of cocoa diseases. Hebbar can be reached at 301-734-5717 or prakash.hebbar@aphis.usda.gov.

Jonathan Jones has moved into an advisory role with the USDA APHIS National *P. *ramorum* Program, functioning as a team member rather than program manager. In addition to his responsibilities with the *P. ramorum* team, he is now the program manager of golden nematode and the pale cyst nematode programs. He also serves on the grasshopper and fire ant teams as a back-up to the Program Manager Charles Brown. Jones can be reached at 301-734-5038 or jmjones@aphis.usda.gov.

CALENDAR OF EVENTS

11/4 - 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 kpalmieri@berkeley.edu, and provide your name, phone number, affiliation and license number (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 kpalmieri@berkeley.edu.

11/7 – Sudden Oak Death in Sonoma County Community Workshop; 10:30 a.m. – 12:30 p.m.; Rohnert Park 4-H Center; 6445 Commerce Blvd., Rohnert Park; This class is free and open to all interested parties. Pre-registration is not required. For more information, contact Lisa Bell at (707) 565-2050 or lkbell@ucdavis.edu.

11/17 – 11/18 - 58th Annual Meeting of the California Forest Pest Council, What's Ailing California's Forests?; Heidrick Ag History Center; 1962 Hays Lane, Woodland, CA 95776; For more information, contact Kim Camilli at 805-550-8583 or kim.camilli@fire.ca.gov or go to the CA Forest Pest Council website at http://caforestpestcouncil.org/.

11/18 – 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 11/4 listing above.

12/5 – Sudden Oak Death in Sonoma County Community Workshop; 10:30 a.m. – 12:30 p.m.; University of CA Cooperative Extension Office, Santa Rosa; 133 Aviation Blvd, Ste. 109, Santa Rosa; This class is free and open to all interested parties. Pre-registration is not required. For more information, contact Lisa Bell at (707) 565-2050 or lkbell@ucdavis.edu.

12/9 - 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 11/4 listing above.

3/7/10 – 3/12/10 - 5th IUFRO *Phytophthora* in Forest Trees and Natural Ecosystems Conference; Rotorua, New Zealand; For more information or to register, go to http://www.phyto2010.com/registration.html.