



CALIFORNIA OAK MORTALITY TASK FORCE REPORT JANUARY 2004

MONITORING

***Phytophthora ramorum* detected on beech, oak and horse chestnut trees in Europe**

Phytophthora ramorum has been found infecting beech, southern and northern red oak, Holm oak, and horse chestnut trees in the Netherlands and UK. New findings of *P. ramorum* in tree species have raised concern for pathogen spread from infected shrubs to European trees. Until this fall, European *P. ramorum* infections had been limited to nursery plants and garden shrubs in nine European countries.

In the Netherlands, a single northern red oak (see link: [Quercus rubra](#)) in a park in the eastern part of the Netherlands near Nijmegen, died quickly last summer with bleeding associated with bark cankers indicating the presence of *P. ramorum* (see link: [P. ramorum](#)). Samples tested positive for *P. ramorum*, first by DNA analysis, then by culturing a European-A1 population isolate. The infestation was identified on rhododendron about one year ago, and last March approximately 60 infected rhododendrons were cut back in the area and all debris burned. It is not known whether the *Quercus rubra* infection occurred before or after the treatment. Recently identified symptomatic rhododendrons will be removed from the site in the next few weeks. Neighbouring red oaks and beeches will be monitored closely for symptoms.

In the UK, a single *P. ramorum* infected southern red oak (*Quercus falcata*) was detected in Sussex, England (*Q. falcata* with *P. ramorum*. See link: [Q. falcata](#)) Additionally at two sites in Cornwall, *P. ramorum* was isolated from infected European beech (*Fagus sylvatica*), Holm oak (*Quercus ilex*) and horse chestnut (*Aesculus hippocastanum*). The beech and horse chestnut showed bleeding from the bole, while leaf spots were present on the Holm oak. In all cases, the infected trees were growing within a few to twenty meters of *P. ramorum* infected rhododendrons detected approximately a year ago. Infected rhododendrons are removed on a case by case basis as determined by regulatory officials.

Background on *P. ramorum* in Europe. In Europe, the pathogen was first isolated in 1993 on declining rhododendron and viburnum in nurseries and gardens in Germany and the Netherlands. The finding was largely ignored until 2000, when the discovery of a morphologically similar organism associated with oak and tanoak mortality in California provided incentive to finally name it in 2001. Shortly after being named *Phytophthora ramorum*, the European Union quarantined the pathogen, which triggered survey and inspection. Infected plants were detected and destroyed in nurseries and gardens in the UK, France, Poland, Spain, Italy, Belgium, Sweden, Germany and the Netherlands. In 2002, the pathogen was detected throughout the UK in over 300 nurseries or gardens. A

map of detections in the UK may be viewed at <http://www.defra.gov.uk/planth/graphics/sod.pdf>. Many *P. ramorum* hosts including camellia, pieris, mountain laurel, yew, lilac and witch-hazel were first detected in Europe.

While isolates from Europe and North American appear to be similar they are recognized as being from separate populations with differing growth rates in culture, different average aggressiveness to bark, and slightly different DNA. Additionally most isolates in Europe are the A1 mating type, while all wildland isolates from California and Oregon are A2 mating type. Because of these differences it was hypothesized that there was some difference in the European isolate that rendered European trees immune. This is now being shown to be false.

Implications for Europe. The implications of the findings for Europe are described in a UK pest risk assessment <http://www.defra.gov.uk/planth/pras/sudd.pdf>. Beech is native and quite widespread in the UK, while Holm oak and horse chestnut were introduced from southern Europe. *Quercus rubra* and *Quercus falcata* are native to the US but extensively planted throughout much of Europe.

Implications for the United States. Northern red oak (*Quercus rubra*) is among the highest value hardwood timber tree species in the US and a vital habitat component for dozens of wildlife species that feed on its acorns. Northern and southern red oak (*Quercus falcata*) are native and widespread in the eastern US forests, and several shrub hosts (*Kalmia latifolia*, *Rhododendron maximum*, and *R. catawbiense*) are present in the forest understory ([see range maps](#)). This combination of confirmed susceptible oaks and understory foliar hosts increases the concern of *P. ramorum* spread to the Southeast and Northern Atlantic forests. Potential for ecological and economic damage due to *P. ramorum* in eastern forests has been described by Gottshalk (see <http://danr.ucop.edu/ihrmp/sodsymp/poster/poster05.html>). Also of concern, European beech and horse chestnut are planted extensively in landscaping nationwide as are camellia, rhododendron, pieris, viburnum and other previously identified *P. ramorum* hosts.

References

- Maarten Steeghs, Plant Protection Service, The Netherlands – personal communication.
- Clive Brasier, Pathology Branch, Forest Research Agency, UK – personal communication.
- Kurt Gottshalk, USDA Forest Service, Northeastern Research Station, Morgantown, WV. – poster presented at SOD Science Symposium, Dec. 2002 <http://danr.ucop.edu/ihrmp/sodsymp/poster/poster05.html>.
- USDA, NRCS Plants National Database: <http://plants.usda.gov/index.html>.
- UK Forestry Commission website: <http://www.forestry.gov.uk>.
- Department of Environment, Food and Rural Affairs (DEFRA, UK) website: <http://www.defra.gov.uk/>

Results from a risk-based early detection survey for *Phytophthora ramorum*

Since leaf spots are often the earliest symptom of *Phytophthora ramorum*'s establishment in a new area, a ground-based early detection survey was carried out in 16 coastal California counties from Del Norte to Santa Barbara in 2003. With over 10 million acres to survey, Ross Meentemeyer, Sonoma State University and Wally Mark, Cal-Poly State University – San Luis Obispo used host species distribution and the statewide risk model developed by Meentemeyer to select areas at high risk to survey.

One hundred forty-eight, 0.2 acre plots were surveyed (see figure 1, [MAP](#)). Plot locations were selected randomly over public lands and distributed across high, moderate, and low risk habitats. All risk levels were surveyed to obtain a statistically valid census of disease incidence.

P. ramorum was detected on 9 plots, but no startling new finds were detected; the positive plots were adjacent to areas known to be infested. *P. ramorum* was not detected on the 94 sites that were visited along the North Coast (Del Norte, Humboldt, Lake, Mendocino, Siskiyou and Trinity Counties). *P. ramorum* was detected on 8 of the 26 plots in the Bay Area (Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Santa Cruz and Sonoma Counties). In the central coast, *P. ramorum* was detected on 1 of 8 plots in Monterey County and none of the 20 plots in San Luis Obispo, San Benito and Santa Barbara Counties.

Funding for the project was provided by the USDA-Forest Service, State and Private Forestry and CA State University, Agricultural Research Initiative. For more information contact Ross Meentemeyer at Ross.meentemeyer@SONOMA.EDU or Wally Mark at wmark@calpoly.edu.

Preliminary results indicate *Phytophthora ramorum* was not detected in a nursery survey in Ohio. In the summer of 2003, 15 ornamental nurseries in 11 Ohio counties were surveyed for *Phytophthora ramorum* with 235 samples collected from foliar lesions and twig dieback on rhododendron and azalea plants. In the laboratory, specimens were placed on *Phytophthora* semi-selective medium (PARP) and subcultured to purity on PARP and then V8 juice agar. ELISA tests for detection of *Phytophthora* spp. were conducted on both the plant tissues and the resulting pure cultures. Approximately 50 *Phytophthoras* were cultured out of 235 attempts. For species identification following this preliminary identification to genus, extracted DNA was amplified at the ITS region of the rDNA operon. The ITS region of all cultures was sequenced, and blasted against NCBI databases using BLASTN. All cultures were confirmed as *Phytophthoras*, the following species were identified: *cactorum*, *citricola*, *citrophthora*, *inflata*, *insolita* (ID still tentative), and *nicotianae*. No *P. ramorum* was detected among the isolates. A second round of sequencing will be conducted to confirm these preliminary results. The survey was funded by USDA Animal and Plant Health Inspection Service (APHIS). For more information contact Pierluigi (Enrico) Bonello, Dept. of Plant Pathology, Ohio State University, bonello.2@osu.edu.

MANAGEMENT

Sudden Oak Death-related hazard tree removals in Sonoma County State Parks

Twenty-four more trees were removed from the family campground at Sugarloaf Ridge State Park, northeast of Kenwood, in November 2003. This follows removal of 19 weakened and dying *P. ramorum* infected trees in 2002. The removals have dramatically changed the campground's appearance and caused intermittent closure of approximately half of the 49 campsites at the park. All removals were carried out with assistance from the Sonoma County Agricultural Commissioner's portion of the State Sudden Oak Death Tree Assessment, Removal, and Restoration Plan funds.

Hundreds of *P. ramorum* infected trees have also died within Jack London State Historic Park, located near Glen Ellen. Diseased and dead trees near the historic sites and along roadsides were recently removed, and four large trees are currently slated for removal adjacent to the historic Wolf House Ruins.

Campground closures continue to occur regularly for tree inspections and removals. All woody debris and tree parts are quarantined by the Sonoma County Agricultural Commissioner's Office. For the 2002 removals, all woody debris was burned on-site using an Air Curtain Burner which was very labor intensive, time consuming and disruptive to the campground operation. The woody debris generated during 2003 was taken to the SODBusters yard in Marin County.

Working closely with Sonoma County Agricultural Commissioner's Office, Senior State Park Resource Ecologist Marla Hastings will be inspecting the high-use areas at both Jack London and Sugarloaf Ridge State Parks intensively over the next several years since they continue to experience *P. ramorum*-related tree mortality and failure. The park may apply the preventative phosphonate treatment to a very large, heritage, coast live oak tree located at the Jack London Cottage. Hasting notes that they could not have accomplished these critical tree removals without the State funds, and the help of Stefan Parnay and Cree Morgan of the Agricultural Commissioner's Office.

REGULATIONS

Six host plants are being added to the federal (7 CFR 301.92), Oregon and California *Phytophthora ramorum* quarantines. The plants and restricted plant parts are:

- *Camellia sasanqua* (nursery stock and leaves)
- *Pieris formosa x japonica* (nursery stock, twigs, and leaves)
- *Pieris floribunda x japonica* (nursery stock, twigs and leaves)
- *Pieris japonica* (nursery stock, twigs, and leaves)
- *Viburnum plicatum var. tomentosum* (nursery stock and all plant parts except seeds)
- *Hamamelis virginiana* (nursery stock, twigs, and leaves).

Researchers in Oregon and the United Kingdom identified these new *P. ramorum* host species. Witch-hazel, *Hamamelis virginiana* was found in an established planting in a large public garden in the UK. The other five species were found in an Oregon nursery.

The change will be posted at the USDA Animal and Plant Health Inspection Service (APHIS) website: www.aphis.usda.gov/ppq/ispm/sod. California's emergency amendment to add these hosts became effective January 5, 2004. The text is posted under [Regulations](#) at <http://www.suddenoakdeath.org/>

PUBLICATIONS

The first report of *Phytophthora ramorum* on *Camellia japonica* in Spain was published in *Plant Disease*, Nov. 2003, Vol 87, Number 11.

TRAINING

Detection and Control of *Phytophthora ramorum* in Nurseries

Date: Wednesday, January 28, 2004, Santa Cruz County Cooperative Extension Office, 1432 Freedom Blvd., Watsonville

or

Tuesday February 3, 2004, Lions Club Hall, 417 Lincoln Ave., Woodland

Time: 10 am to 3:45 pm

Cost: Free

For registration information, see <http://www.suddenoakdeath.org/>, and click on the [Upcoming Events](#) link on the homepage.

This one-day training session will cover identification of *P. ramorum* on horticultural plants, nursery research, regulations, detection surveys and nursery best management practices. A new **Nursery Guide for Diseases of *Phytophthora ramorum* on Ornamentals** will be distributed. The class is designed for nursery workers, inspectors and others interested in detection and control of *P. ramorum* in nurseries and Christmas tree farms. California Department of Pesticide Regulation credits, 1.5 Laws and Regulations, 3.5 Other, are available. The class is presented by the California Oak Mortality Task Force (COMTF), USDA-Forest Service (USDA-FS), California Department of Forestry and Fire Protection (CDF), California Department of Food and Agriculture (CDFA), USDA Animal and Plant Health Inspection Service (APHIS), and University of California Cooperative Extension (UCCE).

DATES TO REMEMBER

1/28 – Training for southern region on Detection and Control of *Phytophthora ramorum* in Nurseries, Santa Cruz County Cooperative Extension Office, 1432 Freedom Blvd., Watsonville. For more information contact Karl Buermeyer, <mailto:krbuermeyer@ucdavis.edu>.

2/3 – Training for northern region on Detection and Control of *Phytophthora ramorum* in Nurseries, Lions Club Hall, 417 Lincoln Ave., Woodland. For more information contact Karl Buermeyer, <mailto:krbuermeyer@ucdavis.edu>.

2/29 to 3/14 - The Art of Saving Oaks. University of California, Santa Cruz Arboretum, Horticulture II Building, For details call (831) 427-2998. Speakers: Keyt Fisher,

conservation ecologist. Wildlife Conservation Society, Sunday, February 29, 1:30pm,; Glen Keator, botanist and author of *The Life of an Oak*, Sunday, March 7, 1:30pm.

3/9 to 3/10 – California Oak Mortality Task Force (COMTF) Spring Meeting and Field Trip, Sonoma State University (SSU). Tuesday, March 9 – Field Trip to Fairfield Osborn Preserve (5 miles from SSU). Wednesday, March 10 – COMTF Spring Meeting – Research Update; Sonoma State University, Rohnert Park, CA . Details will be provided in February newsletter or contact Lucia Briggs, at lbriggs@nature.berkeley.edu.

3/24 - Sudden Oak Death Workshop: Current research and treatment strategies. TCI (Tree Care Industry Association) Expo Spring 2004. 9:00 am to 3:30 pm. The Expo runs through Friday, March 26 at the Sacramento Convention Center, Sacramento, CA. For more information contact Carol Crossland, crossland@treecareindustry.org or see <http://www.treecareindustry.org/>.

4/22 - Training session for *Phytophthora ramorum* recognition, quarantine compliance, and treatment. Southern region: Santa Cruz County, exact location pending. Details will be provided in future newsletters or contact Lucia Briggs, at lbriggs@nature.berkeley.edu.

5/20 – Training session for *Phytophthora ramorum* recognition, quarantine compliance, and treatment. Northern region: Sonoma County, exact location pending. Details will be provided in future newsletters or contact Lucia Briggs, at lbriggs@nature.berkeley.edu.

A LOOK BACK AT *PHYTOPHTHORA RAMORUM* IN 2003 – CALIFORNIA

2003 brought isolations of *Phytophthora ramorum* from native trees in Europe, from nurseries in the Pacific Northwest and one in California's Central Valley, registration of a preventive treatment, and many other significant and surprising developments concerning *P. ramorum*. In this, and the next COMTF newsletter, we will recap some of 2003's activity and significant events related to *P. ramorum*. For monthly highlights see the chronology at <http://www.suddenoakdeath.org/>, About Sudden Oak Death (see [chronology](#)). This month we feature some of California's *P. ramorum* infrastructure: the California Department of Food and Agriculture's *P. ramorum* diagnostic laboratory and the OakMapper Web GIS database for *P. ramorum*. Next month we will feature an update from Oregon.

OakMapper Web GIS database for *Phytophthora ramorum* - 2003 overview

Maps and other distribution information for *Phytophthora ramorum* reside at the OakMapper, <http://www.oakmapper.org> and are accessible via <http://www.suddenoakdeath.org/>. The site is overseen by Maggi Kelly, UC-Berkeley, and funded by the California Department of Forestry and Fire Protection and USDA-Forest Service. Below is a 2003 summary of *P. ramorum* confirmed locations in California, website activity, and information available at the site.

General statistics and changes in *P. ramorum* wildland distribution. The number of official *P. ramorum* confirmations from California wildlands has increased to 485 in the 12 infested counties (this number does not include confirmations from nurseries and other contained facilities). One hundred eighty-six new wildland confirmations were added in 2003. Monterey County has experienced the most significant expansion of infested area with the disease confirmed near Plaskett Creek approximately 10 miles north of the San Luis Obispo County border. Significant new tanoak mortality appeared in several canyons south of Julia Pfeiffer Burns State Park near Big Sur. *P. nemarosa* and *P. pseudosyringae* are also very common on California bay laurel leaves in the canyons along the Big Sur coast.

Twelve *P. ramorum* isolations, clustered in a 2 square mile area in Redway (2 on coast redwood and 10 on California bay laurel) are the only confirmations in Humboldt County. There were no new reports of the pathogen in Mendocino County but Western Sonoma County has experienced widespread scattered tanoak mortality over 20 miles from Guerneville along King's Ridge to east of Stewarts Point. Bleeding coast live oaks and leaf spots on California bay laurel were also scattered across much of Sonoma County.

Over 5,500 visits were logged on the OakMapper webGIS page in 2003. Over 250 requests for customized map, spatial data, and other monitoring material were fulfilled by staff at the Center for the Assessment and Monitoring of Forest and Environmental Resources (CAMFER) at UC Berkeley. In recent months, the hardware and software behind the OakMapper have been upgraded in order to have the most up-to-date and secure system. A user survey to get feedback and find out more information about the specific needs of our audience was developed for distribution in January 2004.

Aerial Survey and Risk Data. OakMapper updates include results from the 2003 Sudden Oak Death aerial survey carried out by Cal Poly San Luis Obispo and the USDA Forest Service with areas of tree mortality and flight lines posted. Data on the potential and imminent risks of Sudden Oak Death assembled by Sonoma State University researchers is also available.

Reports of symptomatic trees. The website features an area where the public can report symptomatic trees. Over 341 submissions of symptomatic trees came from 18 different counties in California, from hikers, homeowners, high school students and others. Over the past three years, reports have come from 32 counties in California; all infested counties are represented except Humboldt County. While reports come from all over the state, 70% of submitted reports come from within the infested counties and another 4% from counties that border infested areas. The most common tree species reported as ailing was coast live oak (46%), followed by tanoak (15%) and California black oak (11%). Another 6% of the submissions reported other species that are known to be *P. ramorum* hosts, including California bay laurel, madrone, coast redwood, Douglas-fir, and big leaf maple.

Publicity/Publications. The OakMapper webGIS site is featured on ESRI's webGIS software page (http://www.esri.com/software/internetmaps/visit_sites.html), in an article in GeoSpatial Solutions, and most recently in the ecology journal 'Frontiers in Ecology and the Environment' published by the Ecological Society of America (Vol.001, issue 10, page 0541).

For more information or to suggest improvements to the OakMapper site, contact Maggi Kelly at <mailto:mkelly@nature.berkeley.edu>, or Karin Tuxen at karin@nature.berkeley.edu

2003 activity report – California Department of Food and Agriculture *Phytophthora ramorum* diagnostic laboratory. Provided by Cheryl Blomquist, Diagnostician

The plant disease diagnostic lab at the California Department of Food and Agriculture in Sacramento processed more than 1866 samples for *Phytophthora ramorum* detection in 2003. Nursery inspections in infested and uninfested counties resulted in over 840 of the samples. Nursery samples were taken primarily by county biologists to comply with the yearly inspection requirement for nurseries located in infested counties that sell *P. ramorum* host plants.

P. ramorum was detected for the first time in two nurseries and reconfirmed in another. Intense sampling followed these detections, with plants traced forward and traced back, inspected and tested. No infected plants were found during the final 90 day inspection period for these nurseries. This fall, all samples from Douglas-fir and Grand fir Christmas tree farms also tested negative for *P. ramorum* (except one sample that is still pending).

In 2003, the CDFA lab isolated *P. ramorum* from 288 samples. Some samples were from the same tree so are not reflected in the total number of new wildland confirmations (186). Other *Phytophthora* species recovered include *P. nemarosa* (54 isolates), *P. psuedosyringae* (6 isolates), and *P. syringae* (2 isolates).

Special surveys accounted for many of the samples including: SODBusters, UC Cooperative Extension; Wildlife Conservation Society; USDA-Forest Service, *P. ramorum* survey methods evaluation; and aerial and ground surveys conducted by Jeff Mai, USDA-Forest Service; Wally Mark, Cal-Poly State University – San Luis Obispo; and Ross Meentemeyer, Sonoma State University. Other samples came from registered professional foresters, arborists, extension workers, homeowners, and nursery workers.