



## CALIFORNIA OAK MORTALITY TASK FORCE REPORT AUGUST 2006

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### RESEARCH

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**The Sudden Oak Death Science Symposium III (March 5-9, 2007 in Santa Rosa) call for papers is now available.** Submissions are encouraged on a broad range of Sudden Oak Death/*P. ramorum* topics, including: biology and pathology, associated organisms, ecology, economic and social impacts, modeling and risk assessment, restoration, management and control strategies, monitoring, silviculture, arboriculture and urban forestry, nursery management, or policy. Abstracts up to one page in length for proposed papers or posters must be submitted by September 15, 2006 (using MS-Word) to Katie Palmieri, California Oak Mortality Task Force (COMTF), at: [palmieri@nature.berkeley.edu](mailto:palmieri@nature.berkeley.edu). Authors of accepted papers and posters will be notified by October 15, 2006.

Following the Symposium, peer-reviewed proceedings will be published by the USDA Forest Service (FS), Pacific Southwest Research Station (PSW). Authors are asked to provide manuscripts. For authors with research results submitted to other outlets, extended abstracts will be accepted instead of manuscripts. Author instructions will be sent out with acceptance notifications.

For more information on the Symposium program, contact Susan Frankel, USDA FS PSW, at: [sfrankel@fs.fed.us](mailto:sfrankel@fs.fed.us). For all other questions, contact Katie Palmieri at: (510) 847-5482 or [palmieri@nature.berkeley.edu](mailto:palmieri@nature.berkeley.edu) or go to the Symposium website at: <http://nature.berkeley.edu/comtf/sodsymposium/index.html>. See "Meetings" below for more information on the Symposium.

**"Understanding *Phytophthora ramorum* Key Findings from UK Research" was posted to the United Kingdom's (UK) Department for Environment, Food, and Rural Affairs (DEFRA) website July 13, 2006.** The six-page document is a summary of findings resulting from research commissioned by DEFRA, the Forestry Commission, and Horticultural Development Council to investigate biology, epidemiology, and management of *P. ramorum* in the UK.

**Englander, L., Browning, M., and Tooley, P.W. 2006. Growth and sporulation of *Phytophthora ramorum* in vitro in response to temperature and light. *Mycologia* 98(3):365-373.**

Abstract: *Phytophthora ramorum*, recently found in the US, is causing concern for hardwood forests and the nursery industry. In an effort to identify some of the environmental limitations to growth and sporulation, we undertook a laboratory study of 4 US and 3 European (EU) isolates. On V8 media, isolates grew when incubated at 2-28° C and produced chlamydospores at 8-28° C. Sporangia were produced at all temperatures tested: 10-30° C for US isolates and 6-26° C for EU isolates. Optimal temperatures were 16-26° C for growth, 14-26° C for chlamydospore production, and 16-22° C for sporangia production. US isolates grew less and produced fewer spores when exposed to increasing doses of near-UV radiation (50-300 iW/cm<sup>2</sup>) and visible radiation (250-1500 iW/cm<sup>2</sup>). EU isolates were exposed to 300 iW/cm<sup>2</sup> near-UV only, which significantly reduced growth of one of three isolates and had no significant effect on spore production. In our studies *P. ramorum* tolerated a broad range of temperature and



light conditions, which suggests that it is capable of establishment in a wide geographic area.

**The following four abstracts are from the American Phytopathological Society (APS) meeting held in Québec City, Canada.** Additional meeting information and abstracts can be found on the APS site at: <http://www.apsnet.org>.

**Parke, J.L., Oh, E., Voelker, S., Ochiai, N., Hansen, E.** *Phytophthora ramorum* reduces xylem sapflow and specific conductivity of sapwood in mature tanoak. *Phytopathology* 96:S90.

Abstract: *Phytophthora ramorum* invades the inner bark of some species of Fagaceae including tanoak (*Lithocarpus densiflorus*), causing lethal bole cankers. In July 2005 we selected 3 symptomatic and 3 asymptomatic tanoak trees within a stand naturally infested with *P. ramorum*, to investigate which specific tissues in the bole are colonized, and to determine if pathogen presence is associated with altered host physiology. Three sapflow sensors were placed on each tree, and data were recorded for several days. Trees were felled, and bole sections were cut into serial transverse sections, 1-cm-thick. Sections were photographed. *P. ramorum* was confirmed by culturing, PCR and SEM. *P. ramorum* colonized the bark and cambium, as well as xylem vessels and fiber tracheids in the sapwood. Discoloration in each of the slices, which was consistently associated with pathogen detection, was used to construct 3-dimensional models of *P. ramorum* infection within the bole sections. Specific conductivity (K(s)) was also determined from excised sapwood samples. Sapflow and K(s) were significantly reduced in infected vs. non-infected trees. This is the first report that *P. ramorum* interferes with water conductance.

**Reeser, P.W., Sutton, W.C., Hansen, E.M.** *Phytophthora siskiyouensis*, a new species from soil and water in Southwest Oregon. *Phytopathology* 96:S97.

Abstract: An unknown *Phytophthora* species was recovered from rhododendron and tanoak leaf baits used for monitoring streams and soils in Southwestern Oregon for the presence of *Phytophthora ramorum*. Isolates of this species yielded ITS-DNA sequences that differed substantially from other *Phytophthora* sequences in GenBank. Morphological features also differed from descriptions of known *Phytophthora* species. Based on the combination of unique morphology and unique ITS sequences, a new taxon is proposed. The new species, *Phytophthora siskiyouensis*, is homothallic, with globose to sub-globose oogonia, which may be terminal, sessile or lateral-intercalary. Antheridia are capitate and mostly paragynous, but sometimes amphigynous. Oospores are mostly aplerotic. Sporangia are ovoid to reniform, with apical, sub-apical, or lateral semi-papilla (occasionally more than one). Sporangia are terminal, sub-terminal, or occasionally intercalary on unbranched sporangiophores, with basal, sub-basal or lateral attachment. Sporangia are weakly deciduous, with variable length pedicels. This combination of characters clearly separates this taxon from other known *Phytophthora* species. *Phytophthora siskiyouensis* refers to the geographic region of origin.

**Tooley, P.W., Browning, M., Englander, L.** Recovery of *Phytophthora ramorum* following exposure to temperature extremes. *Phytopathology* 96:S115.



**Abstract:** The temperature limits on establishment of *Phytophthora ramorum* in regions outside of the U.S. Pacific Northwest are unknown. To identify temperatures and exposure periods lethal to *P. ramorum*, we exposed hyphal colonies to temperatures ranging from  $-5$  to  $-25^{\circ}\text{C}$  for up to 24 h, and from  $30$  to  $50^{\circ}\text{C}$  for up to 8 h. In addition, infected Rhododendron 'Cunningham's White' leaf disks ( $0.3\text{ cm}^2$  diameter) were incubated in sand, sandy loam, and loam adjusted to 30% or 60% water-holding capacity for up to 7 days. Survival was characterized by recovery of *P. ramorum* on V8 juice or PARPH selective media. Hyphal colonies failed to regrow following incubation at temperatures greater than or equal to  $42.5^{\circ}\text{C}$  for under 10 min,  $40^{\circ}\text{C}$  for 15 min, and  $37.5^{\circ}\text{C}$  for 2 h. There was some recovery of colonies following 24 h incubation at  $-25^{\circ}\text{C}$ , the lowest temperature tested. There was no recovery of *P. ramorum* from infected leaf disks, regardless of media or moisture levels, following incubation at  $40^{\circ}\text{C}$  for 3 days,  $35^{\circ}\text{C}$  for 4 days, or  $-20^{\circ}\text{C}$  for 2 to 4 days. Long term studies employing diurnal temperatures based on historical weather data are in progress.

**Wamische, Y.A., Jeffers, S.N., Hwang, J.** *Phytophthora ramorum* and other species of *Phytophthora* detected in field soil and water at retail nurseries in the southeastern USA. *Phytopathology* 96:S120.

**Abstract:** Nurseries in the southeastern USA that received plants in 2004 colonized by *Phytophthora ramorum* are being monitored to determine if this pathogen escaped and became established. In Feb 2006, water and field soil were collected from six retail nurseries in one state. Water samples were collected from streams, retention basins, and irrigation ponds; samples of field soil were collected from areas where diseased plants previously had been located. Water samples were filtered through membrane filters to trap propagules, and soil samples were flooded and baited with camellia and rhododendron leaf pieces. *Phytophthora* spp. were recovered from all water samples and from several soil samples. At one nursery, *P. ramorum* was recovered from standing water in a retention basin and from field soil in a loading/holding area behind the nursery. However, *P. ramorum* was not recovered in additional water samples collected 2 weeks later. These results suggest that *P. ramorum* may have escaped at this location from contaminated plants received in 2004. Alternatively, the propagules of *P. ramorum* detected in soil and water may be only transient because state officials found camellia plants with ramorum blight were present at this nursery when we collected our samples.

#### **Other *Phytophthora* papers:**

**Davison, E.M., Drenth, A., Kumar, S., Mack, S., Mackie, A.E., and McKirdy, S.** Pathogens associated with nursery plants imported into Western Australia. *Australasian Plant Pathology*, 2006, 35, 473–475. Available online at: <http://www.publish.csiro.au/?nid=39>.

**Abstract:** A small survey of the potting mix taken from 15 consignments of nursery grown plants imported into Western Australia from other states in Australia found that *Phytophthora* spp. were present in 10% of the samples and *Pythium* spp. were present in 25% of the samples. Plant pathogenic nematodes were isolated from 12 of 13 consignments. Potting mix appears to be an important route by which plant pathogens can be passively introduced into Western Australia.

**REGULATIONS**

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**Effective August 1, 2006 *Ceanothus thyrsiflorus*, *Cinnamomum camphora*, *Kalmia angustifolia*, *Nerium oleander*, *Osmanthus fragrans*, *Osmanthus heterophyllus*, and *Quercus acuta* will be added to the USDA Animal and Plant Health Inspection Service (APHIS) list of regulated “Plants Associated with *Phytophthora ramorum*.”** Additionally, *Fagus sylvatica*, *Kalmia latifolia*, *Quercus cerris*, *Salix caprea*, and *Viburnum* spp. have been transferred to the “Proven Hosts Regulated for *Phytophthora ramorum*” list, based on the completion of Koch’s postulates. The information was provided by APHIS in an Official Pest Report via the North American Plant Protection Organization’s Phytosanitary Alert System.

**MONITORING**

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**During June and July 2006, the USDA Forest Service and Cal Poly San Luis Obispo conducted aerial surveys to map oak and tanoak mortality in Mendocino, Humboldt, Del Norte, San Luis Obispo, western San Benito, and Santa Barbara Counties.** Western Monterey was also surveyed as part of the Big Sur SOD Management Program. In total, approximately 20,000 acres of mortality were mapped, 9,000,000 acres surveyed, and 6,667 miles flown. Flight lines and areas mapped with mortality are available on the [Oakmapper](#) website. Follow-up ground-check surveys, gathering symptomatic vegetation samples for laboratory diagnosis, are still under way. Results received so far from the California Department of Food and Agriculture and the Rizzo, UC Davis lab show two new *P. ramorum* confirmations in southern Mendocino County in the Indian Creek and Navarro River watersheds between Ukiah and Booneville.

**The 2006 USDA Forest Service National Early Detection Survey for *P. ramorum* in Forest Environments is under way.** To date, three out of 36 cooperating states have completed field work, and nearly 500 locations have been surveyed nationally. About 1,100 samples have been submitted, with nearly half having diagnostics complete, and all results negative for *P. ramorum*. Approximately two-thirds of the sites surveyed so far have been nursery perimeter locations.

**NURSERIES**

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**An Alabama retail nursery was confirmed positive for *P. ramorum* July 11, 2006.** The infected *Camellia* sp. was found on the nursery cull pile during a *P. ramorum* National Nursery Survey inspection.

**A *P. ramorum*-positive *Viburnum mariesii* was found on July 18, 2006 at a small Indiana retail outlet as the result of a trace-forward investigation from a production nursery in Clackamas County, Oregon.**

***Pieris* sp. ‘Mountain Fire’ was confirmed *P. ramorum*-positive July 25, 2006 at a Georgia retail nursery during a trace-forward investigation from a production nursery in Clackamas County, Oregon.** The Confirmed Nursery Protocol is under way.

***P. ramorum*-positive *Syringa vulgaris* ‘Ludwig Spaeth’ was confirmed positive on July 25, 2006 at a small Maine retail nursery as a result of a**



**trace-forward investigation from a production nursery in Clackamas County, Oregon.**

**A Mississippi retail nursery was confirmed positive for *P. ramorum* June 7, 2006.** The infected *Camellia* sp. was identified during a *P. ramorum* National Nursery Survey inspection. Trace-back investigations are being conducted. CNP is under way at the facility.

***P. ramorum* federal order compliance agreements, trace-forward/-back investigations, the USDA APHIS National Nursery Survey, and other investigations are ongoing.** To date, 48 sites in 9 states have had *P. ramorum* detections. Positive findings by state are: AL(1), CA(25), FL(2), GA(1), IN(1), ME(1), MS(1), OR(13), and WA(3).

**In California, *P. ramorum* was detected in one production nursery in July.** *Camellia japonica* 'Kramer's Supreme' was confirmed at the Napa County facility as a result of a Sacramento County nursery trace-forward investigation. The nursery is not under a compliance agreement and does not ship out of the 14 quarantined counties. The addition of this facility brings California's 2006 total number of confirmed nurseries to 25, compared to 53 in July 2005.

#### **MEETINGS**

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**The Sudden Oak Death Science Symposium III will be held at the Hyatt Vineyard Creek Hotel and Spa in Santa Rosa, California from March 5-9, 2007.** The conference is aimed at researchers, natural resource and horticultural managers, regulators, policy makers, and public and private interest groups. Conference participants may receive a special conference room rate; government lodging rates are also available on a first come first served basis. Conference registration will include an opening reception, poster session, refreshments, and handouts. An optional field trip will also be offered. Travel expenses and registration fees are the responsibility of the speakers. For more information on the Symposium or the call for papers, go to the Sudden Oak Death Science Symposium III website at: <http://nature.berkeley.edu/comtf/sodsymposium/index.html>.

**The COMTF, in conjunction with the Kashia Band of Pomo Indians and the North Coast Resource Conservation and Development Council, hosted a community workshop in Guerneville, CA on July 20, 2006.** More than 50 local residents attended the public meeting to hear the latest information on Sudden Oak Death and other forest management issues. During the meeting, landowners expressed great concern over increased fire risk in the area given the steep canyon landscape and thousands of dead tanoaks. The Task Force is working to address this issue by bringing State and local fire officials, as well as public representatives to the area to discuss potential management solutions.

#### **WWW.SUDDENOAKDEATH.ORG**

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**The COMTF website ([www.suddenoakdeath.org](http://www.suddenoakdeath.org)) has been updated with the intent of making the site more user-friendly.** The updated site includes new short videos of *P. ramorum* releasing zoospores and a flyover of Marin County. Other featured postings include: a current host and associated host list, a "What's New" section, updated Best Management Practices, an easy to follow "How to diagnose if your plant



has *Phytophthora ramorum*" guide, and a diagnostic key for sample submission. The menu bar has also been revised for easier navigation, and the photo library has been expanded to include new symptomatic host photos. Any comments or suggestions on how the site can be improved further would be appreciated, and may be sent to: to Deborah Zierten, UC Cooperative Extension, Marin County, intern, at [dlzieren@ucdavis.edu](mailto:dlzieren@ucdavis.edu).

#### **PERSONNEL**

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**Daniel Huberli, a post doc. in the UC Berkeley Garbelotto lab, has accepted a Research Fellow position in the "Centre for *Phytophthora* Research and Management" at Murdoch University in Australia.** In his new position, he will be looking at the effect of stress (fire, drought and waterlogging) on the efficacy of phosphite uptake to control *Phytophthora cinnamomi*. He will also be supervising a project working on determining the susceptibility of Australian plants to *P. ramorum*. After August 20, Daniel can be reached by phone at: +61 8 9360 6486 or via email at: [D.Huberli@murdoch.edu.au](mailto:D.Huberli@murdoch.edu.au).

#### **CALENDAR OF EVENTS**

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**10/9 – 12/2006 – 6<sup>th</sup> California Oak Symposium, titled "California's oaks: Today's challenges, tomorrow's opportunities;"** The conference features a field trip and two indoor sessions on Sudden Oak Death, and is intended for academics, planners, conservation practitioners, foresters, arborists, land owners, and oak enthusiasts. For more information, visit the Symposium website at: <http://danr.ucop.edu/ihrmp/symposium.html>.

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

#### **HOSTS OF THE MONTH**

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***Nerium oleander* - oleander (Apocynaceae) – is an evergreen shrub or small tree native to the Mediterranean.** Growing 3-20 ft. tall and 4-12 ft. wide, its narrow, 4-12 in. long bright green, leathery leaves have a prominent white midrib. Blooming from late spring to fall, the fragrant, 2-3 in. wide flower clusters grow at twig and branch ends and can be found in shades of white, yellow, pink, salmon, and red. Oleander is an exceptionally tough plant and is commonly planted along California highways.

Traditionally Oleander has been used as a heart stimulant and as a skin treatment for rashes and scabies; however, due to the difficulty of standardizing herbal preparations, and the plant being very poisonous, the use of oleander in self-medication is no longer considered safe.

*P. ramorum*-positive *Nerium oleander* was found at a Humboldt County nursery, and has since been officially added to the official USDA APHIS Plants Associated with *P. ramorum* list. Symptoms included leaf tip necrosis, with the most symptomatic leaf lesions covering up to a quarter of the leaf area. Lesions on oleander, as with most lesions due to *Phytophthora* infections, were wet and flexible, not dry and crisp.



## Resources:

- Van Wyk, Ben-Erik and Wink, Michael. Medicinal Plants of the World. Portland, OR: Timber Press, Inc., 2004. 215.
- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. 482.

***Quercus acuta*- Japanese evergreen oak (Fagaceae) – is an evergreen tree native to East Asia.** Growing 20 – 30 ft. in height and 15 – 20 ft. wide, it is round to oval in shape and has dense, low branching, with smooth grey bark. Leaves of the Japanese evergreen oak grow 2.5 – 5 in. long and are dark green and glossy, with a paler underside, with new growth purplish-brown in color. The monoecious flowers are pollinated by wind, and followed by brown, cupped acorns.

After leaching out tannins, tree seeds can be ground into a powder and used for making bread or as a thickening agent for stews. The roasted seed is also used as a coffee substitute. Medicinally, the galls produced on the tree are strongly astringent and can be used in the treatment of hemorrhages, diarrhea, or dysentery. Additionally, a mulch made of Japanese evergreen oak tree leaves repels slugs and grubs, although fresh leaves should not be used as they may inhibit plant growth.

*P. ramorum*-positive *Quercus acuta* was found in the United Kingdom (UK). Symptoms included bleeding trunk cankers. Consequently, USDA APHIS has added this species to the list of regulated Plants Associated with *Phytophthora ramorum*.

## Resources:

- Gilman, Edward F. and Watson, Dennis G. *Quercus acuta* Japanese Evergreen Oak. Fact Sheet ST-539. October 1994. Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. <http://hort.ufl.edu/trees/QUEACUA.pdf>.
- Plants for a Future, “*Quercus acuta*” [http://www.ibiblio.org/pfaf/cgi-bin/arr\\_html?Quercus+acuta](http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Quercus+acuta).

***Cinnamomum camphora* – camphor tree (Lauraceae) – is an evergreen tree native to China, Taiwan, and Japan.** This slow-growing, strong-structured tree has a substantial trunk with heavy, upright spreading limbs, and grows to more than 50 ft. in height. Its leaves grow 2.5 – 5 in. long and are a glossy green with three main veins arriving from near the base. When crushed, the leaves produce an aromatic camphor smell. New foliage in early spring appears pink, red, or bronze, maturing to a shiny yellow-green. Fragrant yellow flowers bloom in spring, followed by small blackish fruits.

Camphor tree timber can be distilled to produce an essential oil. Traditional uses of camphor include colds, influenza, fever, pneumonia, inflammation, and diarrhea. However, camphor is toxic in large doses and should not be used without professional supervision.

*P. ramorum*-positive *Cinnamomum camphora* was found in the UK. Symptoms included shoot tip die-back and stem necrosis or canker. Consequently, USDA APHIS has added this species to the list of regulated Plants Associated with *Phytophthora ramorum*.



Resources:

- Van Wyk, Ben-Erik and Wink, Michael. Medicinal Plants of the World. Portland, OR: Timber Press, Inc., 2004. 104.
- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. 275.