



CALIFORNIA OAK MORTALITY TASK FORCE REPORT APRIL 2006

MONITORING

***Phytophthora kernoviae* has been confirmed at two sites in Northland, New Zealand.** At one of the sites, *P. kernoviae* was isolated from cherimoya or custard apple in an orchard. At the second site in Trounson Kauri Park, a soil sample was found positive for the pathogen. The identifications were made as a result of a Ministry of Agriculture and Forestry (MAF) Operations Research-funded project to determine species of *Phytophthora* present in New Zealand using new DNA technology. To date, Biosecurity New Zealand has not been able to link the infections to imported material. Investigations continue in an effort to determine the pathogen's distribution. For more information on the finding, go to the MAF website at:

<http://www.maf.govt.nz/mafnet/press/240306fungus.htm>. Additional information on *P. kernoviae* can be found at: <http://www.forestry.gov.uk/forestry/infd-66jlgb>.

The first finding of *P. ramorum*-infected *Ceanothus thyrsiflorus* (blue blossom) has been confirmed. Found in southern Humboldt County, the infected blue blossom was growing along the road within a *P. ramorum* treatment area in the lower Salmon Creek watershed, west of Miranda and the South Fork of the Eel River. The blue blossom plant was growing in a Douglas-fir/tanoak-madrone forest with riparian redwood and various mixed hardwoods. Other infected species in the general area include California bay laurel, tanoak, manzanita, Pacific yew, and salmonberry.

P. ramorum symptoms were found on the leaves, stems, and shoot tips of the confirmed blue blossom. Leaf symptoms consisted of necrotic lesions developing along the leaf tips and margins. The lesions had dark, irregular margins, and in some cases entire leaves were necrotic. Symptoms also included necrotic lesions on stems and shoot dieback. Isolations were made from symptomatic tissue onto PARP medium, with *P. ramorum* recovered from leaf, stem, and shoot samples. The USDA Animal and Plant Health Inspection Service (APHIS) is reviewing the findings and anticipates adding *Ceanothus thyrsiflorus* to the federal *P. ramorum* host list soon.

REGULATIONS

New Zealand issued a public notice on March 8, 2006 addressing nursery stock importation concerns, including risk mitigation measures and the host list for *Phytophthora ramorum*. With the exception of high-value plants for which the risk of *P. ramorum* is mitigated alternatively (such as *Vaccinium*), hosts of *P. ramorum* are only permitted to be imported from countries recognized by New Zealand as Pest-Free Areas, which currently include: Australia, Canada, Israel, and South Africa. According to the New Zealand Ministry of Agriculture and Forestry (MAF), as the host list expands, current risk mitigation options threaten to cut-off trade to large amounts of plant propagative material. However, there are programs in Europe and North America which have been developed in line with ISPM 10: Requirements for the Establishment of Pest Free Places of Production and Pest Free Production Sites, to certify places of production as free from *P. ramorum*. MAF is considering permitting imports of plant material from these programs. Public comment closes April 28; the proposed date of adoption and enforcement is May 29, 2006. The current 369-page nursery stock standard can be found at:

<http://www.biosecurity.govt.nz/imports/plants/standards/155-02-06.pdf>. For more



information on the revisions, go to: <http://www.biosecurity.govt.nz/strategy-and-consultation/consultation/ihs>.

Taiwan, Penghu, Kinmen, and Matsu issued a public notice on March 29, 2006 proposing a draft amendment of the “Quarantine Requirements for the importation of plants or plant products.” Among the changes is the designation of *Phytophthora ramorum* as a quarantine pest, whereby: “The importation of living plants (excluding flowers, fruits and seeds) of its hosts will be prohibited. Regions or countries affected: Belgium, British Channel Islands, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Canada (British Columbia), United States (States of California, Florida, Georgia, Oregon, Washington).

NURSERIES

California had three new *P. ramorum*-confirmed nurseries during the month of March, including:

A Sacramento production facility that only ships non-host material interstate was found to be *P. ramorum*-positive March 8 as a result of their annual inspection; consequently, the nursery has been removed from the list of nurseries approved for interstate shipping. All positive plants identified were *Camellia* spp. Sacramento County is working on obtaining a trace-forward list for host and associated host plant material shipped intrastate. The nursery has not been positive previously, and is currently undergoing the confirmed nursery protocol (CNP).

Following a nursery stock cleanliness inspection, a retail nursery in Alameda County was confirmed *P. ramorum*-positive on March 24. All plants identified as positive were *Camellia* spp. The nursery is not under compliance and does not ship out of California’s quarantined area. This nursery was also found *P. ramorum*-positive during trace-forward investigations from other positive nurseries in 2004 and 2005.

A Solano County production facility was found to be *P. ramorum*-positive on March 27 during their 30-day inspection for compliance in the quarantined counties. The positive plant was a *Camellia japonica* 'debutante.' The nursery has had their compliance agreement suspended (for both nursery plants and soil) and is undergoing implementation of the CNP. The nursery does not ship interstate and has not been positive for *P. ramorum* previously. A trace-forward list is being generated for shipments made within CA.

RESEARCH

Monahan, W.B., Koenig, W.D. 2006. Estimating the potential effects of sudden oak death on oak-dependent birds. Online. Biological Conservation 127:146-157.
http://www.elsevier.com/wps/find/journaldescription.cws_home/405853/description#description

Shishkoff, N. March 2006. Susceptibility of *Camellia* to *Phytophthora ramorum*. Online. Plant Health Progress.
<http://www.plantmanagementnetwork.org/update/current/>.



Summary: *Camellia* is a known host of *Phytophthora ramorum*, the “sudden oak death” pathogen. During 2003-2004, the organism was shipped from California throughout the U.S. on infected nursery stock, leading to a nationwide effort to recover the infected plants. This paper describes the symptoms on *Camellia* and the relative susceptibility of nine species and four hybrids.

Tooley, P.W., Martin, F.N., Carras, M.M., Frederick, R.D. 2006. Real-time fluorescent PCR detection of *Phytophthora ramorum* and *Phytophthora pseudosyringae* using mitochondrial gene regions. Online. *Phytopathology* 96(4):336-345. <http://www.apsnet.org/phyto/current/top.asp>.

Abstract: A real-time fluorescent polymerase chain reaction (PCR) detection method for the sudden oak death pathogen *Phytophthora ramorum* was developed based on mitochondrial DNA sequence with an ABI Prism 7700 (TaqMan) Sequence Detection System. Primers and probes were also developed for detecting *P. pseudosyringae*, a newly described species that causes symptoms similar to *P. ramorum* on certain hosts. The species-specific primer–probe systems were combined in a multiplex assay with a plant primer–probe system to allow plant DNA present in extracted samples to serve as a positive control in each reaction. The lower limit of detection of *P. ramorum* DNA was 1 fg of genomic DNA, lower than for many other described PCR procedures for detecting *Phytophthora* species. The assay was also used in a three-way multiplex format to simultaneously detect *P. ramorum*, *P. pseudosyringae*, and plant DNA in a single tube. *P. ramorum* was detected down to a 10⁻⁵ dilution of extracted tissue of artificially infected rhododendron ‘Cunningham’s White’, and the amount of pathogen DNA present in the infected tissue was estimated using a standard curve. The multiplex assay was also used to detect *P. ramorum* in infected California field samples from several hosts determined to contain the pathogen by other methods. The real-time PCR assay we describe is highly sensitive and specific, and has several advantages over conventional PCR assays used for *P. ramorum* detection to confirm positive *P. ramorum* finds in nurseries and elsewhere.

Tubajika, K.M., Bulluck, R., Shiel, P.J., Scott, S.E., and Sawyer, A.J. 2006. The occurrence of *Phytophthora ramorum* in nursery stock in California, Oregon, and Washington states. Online. *Plant Health Progress* doi:10.1094/PHP-2006-0315-02-RS. <http://www.plantmanagementnetwork.org/php/>.

Abstract: Data from nursery surveys conducted in 2003, 2004, and 2005 for ramorum blight and dieback caused by *Phytophthora ramorum* were analyzed to determine which plant cultivars were likely to be infected with *P. ramorum*. Susceptible plant host genera, species, and cultivars were identified using culture and nested-polymerase chain reaction analyses, and disease incidence was calculated. For the genus, species, or cultivar analyses at least 20 samples were utilized in this study. The results indicated that the genus *Camellia* had the highest disease incidence, followed by *Rhododendron* and *Viburnum*. *Camellia* cvs. Setsugekka, Jean May, April Remembered, Winter’s Fire, Kramer’s Supreme, Bonanza, Magnoliaeflora, Apple Blossom, Silver Waves, Yuletide, and Nuccio’s Gem showed the highest risk of *P. ramorum* infection. Four *Rhododendron* cvs. Purple Splendor, Cunningham’s White, Unique, and Nova Zembla were also grouped into the high risk category. All other *Rhododendron* and *Viburnum* plant species were at medium or low risk of infection by the pathogen. This study



indicated that there is a large variation in disease incidence among genera and specific cultivars within a genus. A series of controlled, replicated, and well designed experiments involving a large sample size of plant cultivars is essential in order to identify the underlying reasons for the observed variation in infection risks of the surveyed data.

Related *Phytophthora* Articles:

Drenth, A., Wagels, G., Smith, B., Sendall, B., O'Dwyer, C., Irvine, G., and Irwin, J.A.G. 2006. Development of a DNA-based method for detection and identification of *Phytophthora* species. *Australasian Plant Pathology* 35, 147-159.

Abstract: *Phytophthora* diseases cause major losses to agricultural and horticultural production in Australia and worldwide. Most *Phytophthora* diseases are soilborne and difficult to control, making disease prevention an important component of many disease management strategies. Detection and identification of the causal agent, therefore, is an essential part of effective disease management. This paper describes the development and validation of a DNA-based diagnostic assay that can detect and identify 27 different *Phytophthora* species. We have designed PCR primers that are specific to the genus *Phytophthora*. The resulting amplicon after PCR is subjected to digestion by restriction enzymes to yield a specific restriction pattern or fingerprint unique to each species. The restriction patterns are compared with key comprising restriction patterns of type specimens or representative isolates of 27 different *Phytophthora* species. A number of fundamental issues, such as genetic diversity within and among species which underpin the development and validation of DNA-based diagnostic assays, are addressed in this paper.

Shearer, B.L., Fairman, R.G., and Grant, M.J. 2006 Effective concentration of phosphite in controlling *Phytophthora cinnamomi* following stem injection of *Banksia* species and *Eucalyptus marginata*. *Forest Pathology* 36 (2006) 119-135.

Summary: The effect of phosphite concentration on lesion development by *Phytophthora cinnamomi* in stems and roots of *Banksia grandis* and *Eucalyptus marginata* and in stems of *Banksia coccinea* was assessed during a 4.3 year period after stem injection of phosphite. Lesion length 6 weeks after inoculation was significantly less in roots of *B. grandis* trees that had been stem injected with three concentrations of phosphite (50, 100 and 200 g phosphite/l) at two rates (1 and 2 ml/cm of stem circumference) compared with the not-injected control. With the exception of *B. grandis* trees injected with 50 g phosphite/l, lesion length for the high rate was not significantly different to the low rate.

OTHER ITEMS OF INTEREST

The North American Plant Protection Organization's (NAPPO) Phytosanitary Alert System has issued an update for *Phytophthora alni* (Alder *Phytophthora*), including information on potential new hosts. A lethal root and collar rot disease of alder (*Alder* sp.), this pathogen was first observed in the U.K. in the early 1990s, but not described until 2004. Since initial observations, this pathogen has been found impacting alder in many other parts of Europe, particularly central Europe. The disease poses a significant threat to natural and managed alder



stands in Europe and threatens the stability of riparian ecosystems. The disease likely poses a similar threat to alders on other continents, including North America and Asia. Research has shown the pathogen to be associated with spread via waterways and infected nursery stock, and is believed to have a relatively poor long-term soil survival rate. While *P. alni* has only been reported under natural conditions from *Alnus* species (*Alder cordata*, *A. glutinosa*, *A. incana*, and *A. rubra*), greenhouse inoculation studies suggest that other tree species may be susceptible, including walnut (*Juglans regia*) and chestnut (*Castanea sativa*), as well as wild cherry seedlings (*Prunus avium*). The NAPPO alert can be found at: <http://www.pestalert.org/viewNewsAlert.cfm?naid=15>. For more information on *P. alni*, go to: [http://www.forestry.gov.uk/pdf/fcin6.pdf/\\$FILE/fcin6.pdf](http://www.forestry.gov.uk/pdf/fcin6.pdf/$FILE/fcin6.pdf).

NAPPO has issued an alert regarding the first detection of *Phytophthora tropicalis* in the continental United States. For more information, go to: <http://www.pestalert.org/index.cfm?NAPPOLanguagePref='English'>.

RESOURCES

Presentations from the March 21, 2006 COMTF-wide annual meeting, “*Phytophthora ramorum*: A Management and Research Update,” are now posted to the Task Force website homepage under “Spring 2006 Meeting Presentations” at: www.suddenoakdeath.org.

The European Union - Risk Analysis for *Phytophthora ramorum* (RAPRA) has expanded public access to their [website](#). Now available are images of host symptoms, as well as a natural host database and a database of potential hosts identified in laboratory settings.

EDUCATION

A free indoor half-day COMTF *P. ramorum* Wildland and Nursery training session will be held April 26 at the UC Cooperative Extension, Mendocino County Office. Topics to be addressed include an overview and update on the status of the pathogen as well as research findings; diagnosis and sampling in both wildland and horticultural environments; regulations; sanitation and best management practices; wildland suppression projects; and chemical treatment options. To access the agenda or to register, go to: www.suddenoakdeath.org. For more information on the training, contact Janice Alexander, COMTF Educational Outreach Coordinator, at: (415) 499-3041 or via email at: JAlexander@ucdavis.edu.

PERSONNEL

Kerri Frangioso has been hired to work with Allison Wickland as co-coordinator of the Big Sur Sudden Oak Death Adaptive Management Project, under the direction of Dave Rizzo, UC Davis. Kerri previously worked on Sudden Oak Death (SOD) issues in the Big Sur region for the Wildlife Conservation Society (WCS), studying the ecological effects of SOD on acorn production in redwood-tanoak forests. While a significant component of Kerri’s job will be community outreach in the Big Sur area, she and Allison will also begin fieldwork in April, establishing long-term ecological monitoring plots throughout the Big Sur region. Both Kerri and Allison work out of the Big Sur Land Trust office on the Monterey Peninsula, and may be reached at: (831) 620-1098. Kerri can also be reached via email at: kfrangioso@ucdavis.edu.



COMTF Chair Mark Stanley is now working with California's Resources Agency and the California Biodiversity Council to develop a coordinated response plan for current and future invasive pests statewide. Participants will likely include state, federal, and non-government organization partners currently working on invasive species issues. Similar to the COMTF, this effort will bring various resources and expertise together, in an effort to develop coordinated response strategies to minimize the economic, social and environmental impacts of invasive species in California. For more information, contact Mark Stanley at: mark.stanley@fire.ca.gov.

THANK YOU

The March COMTF-wide meeting in Carmel, CA was a great success thanks to all speakers and attendees. With 25 presenters, 5 moderators, 3 field trip speakers, and 148 people at the indoor session, we had a very full and productive schedule. Thank you for all of the completed surveys and positive feedback. We will be sure to incorporate suggestions into our next meeting.

CALENDAR OF EVENTS

- 4/17 – Call for Papers Abstract Deadline for the 6th California Oak Symposium;** Topics accepted include monitoring, restoration, regeneration, livestock relations, utilization, recreation, ecology, fire, wildlife, conservation easements, pest and diseases; Coordinated by the UC Integrated Hardwood Range Management Program; For more information, go to: <http://danr.ucop.edu/ihrmp/symposium.html> or contact Sherry Cooper at: slcooper@nature.berkeley.edu or (530) 224-4902
- 4/20 – Registration Deadline for FREE 5/7/06 Bringing Back the Natives Garden Tour;** Tour runs from 10 a.m. – 5 p.m. at various locations throughout Alameda and Contra Costa Counties; Registrants receive a pass, a guide to low-maintenance gardens, and access to more than 60 talks offered throughout the day; to register, go to: www.BringingBackTheNatives.net; for more information, contact Kathy Kramer at: Kathy@KathyKramerConsulting.net or call (510) 236-9558 between 9 a.m. and 9 p.m.
- 4/26 – Free indoor half-day COMTF Training Session on *P. ramorum* Wildland and Nursery Symptoms, Regulations, Treatments, and Best Management Practices;** 9:00 a.m. – 12:30 p.m.; Cooperative Extension, Mendocino County; 890 N. Bush St.; Ukiah, CA 95482; To access the agenda and to register, go to: www.suddenoakdeath.org; For more information, contact Janice Alexander, COMTF Educational Outreach Coordinator, at: (415) 499-3041 or via email at: JAlexander@ucdavis.edu
- 10/9 – 12 – 6th California Oak Symposium, titled “California’s oaks: Today’s challenges, tomorrow’s opportunities;”** 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>

**HOSTS OF THE MONTH**

The following 6 plants were added to the official list of *P. ramorum* hosts and associated hosts by USDA APHIS in February 2006. All of the newly identified species were found in one British Columbia, Canada nursery.

Acer davidii – David's maple (Aceraceae) – was named after the Jesuit priest, Jean Pierre Armand David, who discovered it in China in 1869. This deciduous tree, native to central China, grows 20 – 35 ft. tall and wide, and has shiny green bark striped with silvery white. Leaves are glossy green, lobed, have deep veins, and grow 2 – 7 inches long and 1.5 – 4 inches wide. New foliage has a bronze-tinted appearance, with fall colors revealed in yellow, red-orange, and purple. Spring flowers are clustered and greenish yellow, and the glabrous samara fruits are approximately 3 cm long and horizontally spread.

David's maple was first identified on 11/25/05 in a Canadian nursery. With Koch's postulates not yet completed, it will be added to the USDA APHIS associated host list.

References:

- Brenzel, Kathleen. *Sunset Western Garden Book*. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 167.
- Oregon State University, Department of Horticulture; Landscape Plants; Images, Identification, and Information, Vol. 1, 1999 - 2006
<http://oregonstate.edu/dept/ldplants/acda.htm>

Ardisia japonica – Japanese Ardisia or marlberry (Myrsinaceae) – is native to Asia, and is one of two species in this genus typically grown in Western gardens. It is a low-growing non-aggressive evergreen shrub that spreads by runners to produce upright branches ranging 6 – 18 inches high. Its leathery, 4-inch-long bright green leaves cluster at the tops of branches. Its pink and white star-shaped flowers, ranging from 2 – 6 in a cluster, appear in fall and are ½ inch in size. The bright red berries can be found throughout winter. This plant makes a good ground cover in the shade, but requires well-drained soil and does not tolerate foot traffic.

Ardisia japonica was first found *P. ramorum*-positive on 12/14/05 in a Canadian nursery. Since Koch's postulates have not been completed, this species will be added to the USDA APHIS Associated Host List.

References:

- Brenzel, Kathleen. *Sunset Western Garden Book*. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 199.
- North Carolina State University, Department of Horticultural Science; Ground Covers, 2000 – 2004
http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/groundcover/ardisia_jap.html

***Euonymus kiautschovicus* (*E. patens*)** – Spreading Euonymus (Celastraceae) – is native to eastern and central China, and grows to 8 ft. tall and at least as wide. This



shrub is often an evergreen, although it may lose leaves or suffer leaf damage if snow is present or temperatures reach 0° F. Its 2 – 3 in. dark-green, thin-textured leaves are oblong shaped and grow in an opposite leaf arrangement. Small greenish white flowers can be found blooming in July and are attractive to bees. The characteristic squarish “hatbox” fruit matures in October and is pink with orange seeds. This durable shrub is often used for landscape structure, as a hedge or divider.

Euonymus kiautschovicus was found *P. ramorum*-positive for the first time on 12/8/05 in a Canadian nursery. With Koch’s postulates not yet complete, it will be added to the USDA APHIS federal *P. ramorum* Associated Host List.

References:

- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 343.
- University of Connecticut; UConn Plant Database of Trees, Shrubs, and Vines, 1999 – 2001; <http://www.hort.uconn.edu/plants/e/euokia/euokia1.html>

Gaultheria shallon – Salal (Ericaceae) – is a member of the heather family and a common evergreen shrub native from California’s central coast to British Columbia. Capable of reaching 4 – 10 ft. tall and slightly wider, in the unfavorable conditions of full sun and poor, dry soil, this plant only reaches 1-2 ft. high. Its nearly round, glossy, bright green leathery leaves are 1 ³/₄ - 4 in. long, and finely serrated. The bell-shaped pendent white or pink flowers are found in 6 in.-long loose clusters and can be seen on reddish stalks in spring. The edible fruit of this plant follows the spring blossoms and appears black, resembling large huckleberries. Although the berries have a bland flavor, birds eat them. Salal is also useful as a groundcover in moist, shady, peaty soils, and branches are also collected for use by florists in bouquets. The name *shallon* is a derivative of Kikwu-salu, the Chinook name for this plant.

Salal was confirmed positive for *P. ramorum* on 12/20/05 in a Canadian nursery. Since Koch’s postulates have not been completed, this species will be added to the USDA APHIS Associated Host List.

References:

- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 361.
- National Museums and Galleries of Northern Ireland; The Garden Flora of Northern Ireland, 2003; http://www.habitas.org.uk/gardenflora/gaultheria_shallon.htm

Hamamelis X intermedia – hybrid witchhazel (Hamamelidaceae) – is a group of winter-blooming hybrid shrubs between *H. mollis* and *H. japonica*. These deciduous shrubs, with upright, loosely branched forms, grow 12-15 ft. high and wide and are often grafted. The bright fall foliage and yellow to red blooming clusters flower in winter, and appear as narrow, crumpled petals, resembling shredded coconut.



Hamamelis X intermedia was found *P. ramorum*-positive 7/6/05 in a Canadian nursery. Koch's postulates have not been completed, so this species will be added to the USDA APHIS Associated Host List.

References:

- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 379.
- North Carolina State University, Department of Horticultural Science; Trees, 2000 – 2003; http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/hamamelis_x_intermedia.html

Leucothoe axillaris – Coast Leucothoe (Ericaceae) - is a relative of *Pieris* and native to the south-eastern US. A spreading, arching evergreen plant that grows 2-4 ft. tall and 3-6 ft. wide, its leathery, shiny leaves are 4 inches long and bronze upon emerging, turning dark-green once mature, and then red in winter. Its drooping urn-shaped creamy white flowers bloom in mid-spring along the stems and grow 1-3 inches long in clusters.

Coast Leucothoe was confirmed *P. ramorum*-positive on 7/6/05 in a Canadian nursery. Since Koch's postulates have not been completed, this species will be added to the USDA APHIS Associated Host List.

References:

- Brenzel, Kathleen. Sunset Western Garden Book. Menlo Park, CA: Sunset Publishing Corporation, 2001. p 430.