

A CHRONOLOGY OF *PHYTOPHTHORA RAMORUM*, CAUSE OF SUDDEN OAK DEATH AND OTHER FOLIAR DISEASES

3/10

- Tests conducted by UK Forest Research show that Japanese larch foliage strongly supports *P. ramorum* sporulation. This inoculum load in the crowns of affected larch has likely led to widespread local infection on the foliage and boles of nearby susceptible tree and understory species, as well as caused bole infections on the larch. Affected understory species include beech, sweet chestnut, oak species, and birch, all of which are known to suffer from bole cankers. Over the past six months a number of conifer species have also emerged as bole hosts, including western hemlock, Port Orford cedar, and Douglas-fir. Western hemlock is also confirmed as a foliar host.
- A lawsuit is filed in Columbia, SC by the CANGC and OAN, seeking to overturn a new SC regulation that requires CA and OR growers shipping plants to SC to comply with additional inspection, documentation and advance notice requirements which are more restrictive than the federal *P. ramorum* rules.

2/10

- The EU1 strain is now the most common *P. ramorum* lineage detected in WA state nurseries and non-nursery sites, with a concurrent rise in NA2 and decrease in NA1.
- Of the 46 WA nurseries found positive since 2003, twenty have been confirmed positive at least two years. Genotype analysis has been performed on samples from 31 nurseries since 2005. Of the nurseries with multiple confirmed years, six had various combinations of two lineages for one or two years and one had a year with all three lineages followed by two other years with two lineages present each year.
- Nine WA non-nursery sites (landscapes, water, soil or trace-forward landscape plants) have been identified *P. ramorum* positive since 2005. Of the sites, the Sammamish River has been confirmed positive for three years with several lineages, and four residential trace-forwards from an EU1-positive nursery have been found in the past two years, all of which have been identified with the EU1 strain.
- Ten species are added to the list of federally regulated *P. ramorum* associated host plants: Mexican-orange (*Choisya ternate*), kousa dogwood (*Cornus kousa*), *Daphniphyllum glaucescens*, European holly (*Ilex aquifolium*), Japanese-oak (*Lithocarpus glaber*), *Magnolia cavaleri*, *Magnolia foveolata*, bayleaf currant (*Ribes laurifolium*), bilberry (*Vaccinium myrtillus*), and lingonberry (*Vaccinium vitis-idaea*).

1/10

- Follow-up sampling findings of the Pierce County, WA perimeter survey reported in the 9/09 COMTF newsletter determine that the infested salal plants in the natural landscape are of the NA2 lineage. This is the first detection of the NA2 lineage on native forest vegetation.
- Findings from the 2009 National *P. ramorum* Early Detection Survey of Forests have resulted in more stream detections outside of nurseries and to the east of the regulated states than in any other year. To date for the 2009 season, five new streams have been found positive – three in AL, one in OR, and one in GA. Since the inception of the survey in 2006, 15 positive streams have been identified, nine of which have been outside of the regulated areas in CA and OR. No established infection has been detected in streamside plants.

11/09

- Japanese larch, western hemlock, and birch are reported as new *P. ramorum* hosts by the UK. Japanese larch symptoms include wilted, withered shoot tips and blackened needles; branch dieback; and branch and upper trunk cankers. Birch (*Betula pendula*) and western hemlock (*Tsuga heterophylla*) are found with bole cankers.

10/09

- *P. ramorum* is detected in a new watershed in Humboldt County. The pathogen was confirmed from leaf baits in Blue Slide Creek, a tributary to the Mattole River with headwaters approximately 5.6 miles northwest of the community of Redway. Blue Slide Creek is located at the southeastern boundary of the watershed. No infected vegetation has been found to date.

9/09

- A Montgomery County, Maryland residence is found to have 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 positive for the pathogen in April 2009.

8/09

- A new Mendocino County watershed is confirmed *P. ramorum* positive. At the far eastern reaches of Big River, a hillside above the Orr Hot Springs resort has been found to have infected CA bay laurel and tanoak. This find is 11 miles north from one of the earliest confirmed Mendocino County infestations in the Indian Creek drainage in 2002.
- A Montgomery County, Pennsylvania residential site is found to have *P. ramorum*-positive *Rhododendron bathyphyllum* on 8/17/09. The detection is the result of a trace-forward inspection of rhododendrons shipped from an

infested nursery in Lane County, Oregon.

7/09

- *P. ramorum* is confirmed in a campground at MacKerricher State Park, 3 miles north of Fort Bragg in Mendocino County, and approximately 40 miles south of the nearest known positive site in Humboldt County. The MacKerricher site is now the northernmost location within Mendocino County from which the pathogen has been isolated.
- A *P. ramorum*-positive Pierce County, Washington retail nursery perimeter survey finds several salal (*Gaultheria shallon*) plants in one colony to be *P. ramorum*-positive on a bank outside the nursery on county land. Water from the infested nursery area drains into the native salal stand. This is a documented incident of *P. ramorum* moving out of an infested nursery and causing disease outside the nursery.
- On 7/31/09, a second *P. ramorum* detection is made on salal outside of the retail nursery in Gig Harbor (Pierce County), Washington. This second find is along the same drainage ditch as the first and across the road from the retail nursery. These salal plants are about 100 meters south of the previously reported salal detection.

6/09

- South Carolina implements state regulations regarding the importation of *P. ramorum* host plants into SC from CA, OR, and WA nurseries. As of 6/26, any *P. ramorum* regulated article moving into SC from a regulated area must be accompanied by a state phytosanitary certificate. Prior notification of host movement is also required at least 24 hours in advance of a scheduled shipment arrival.
- A Kitsap County, WA residential landscape site is found to have *P. ramorum*-positive *Rhododendron* Sp. 'Roseum Elegans' as part of a trace-forward investigation from an infested wholesale/production nursery in Thurston County, WA. The plant is removed and destroyed.
- A Greenville County, SC residential landscape site is confirmed to have a *P. ramorum*-positive *Rhododendron* Sp. 'Catawbiense Boursault'. The detection is made as a result of a trace-forward inspection of plants received from an infested nursery in Snohomish County, WA. The plant is removed and destroyed.

5/09

- Follow-up surveys conducted from 12/08 to 3/09 of a Forsyth County, GA nursery (originally found positive in 12/08) have detected the pathogen inside the nursery as well as off-site where water is draining from the nursery. As part of the National *P. ramorum* Early Detection Survey of Forests, *P. ramorum*-positive findings were obtained in 2/09 from a nearby lake. The lake is used to irrigate the positive nursery as well as an adjacent woody

ornamental nursery (not known to be *P. ramorum*-positive) and an adjacent subdivision (not known to be *P. ramorum*-positive). A stream draining the lake, nurseries, and subdivision was also found positive just downstream from the nurseries in March, April, and May. Additional positives were obtained in April from one of two streams feeding the lake.

- To date, the 2009 National Survey has identified six stream baiting positives in water outside of nurseries in five states: WA (1), MS (1), AL (2), GA (1), and FL (1). All confirmed locations have had more than one positive survey this year. All vegetation samples collected so far in 2009 from a local environs survey outside the MS nursery have been negative for the pathogen after multiple positives in 2008.

3/09

- A rhododendron leaf bait deployed in 12/08 in a Gadsden County, FL stream (outside a previously confirmed positive retail nursery) is found culture positive. The nursery had most recently been confirmed positive in 2/08 from soil and water samples.

2/09

- *P. ramorum* is once again confirmed in McKinleyville's Mill Creek (Humboldt County). The pathogen is recovered from leaf baits deployed and recovered. This is the fourth year that *P. ramorum* has been recovered from McKinleyville streams with no obvious symptomatic hosts.
- The UK confirms the first case of *P. ramorum* on European blueberry (*Vaccinium myrtillus*). The infected blueberry is found in a mixed deciduous woodland with *P. ramorum*-infected *Rhododendron*. USDA APHIS is reviewing the findings and anticipates adding this newly identified host to the federally regulated list of *P. ramorum* hosts.
- USDA APHIS announces that it will be adding *Daphniphyllum glaucescens* to the federally regulated list of *P. ramorum* associated hosts. The pathogen was detected in a British Columbia nursery in 5/08 by the CFIA. Symptoms include leaf spots and necrosis as well as stem dieback.
- Follow-up survey efforts regarding the *P. ramorum*-positive Mississippi nursery and ditch finds last year are still underway. The latest survey efforts resulted in the recovery of *P. ramorum*-positive stream bait samples monthly from 11/08 – 2/09. The positive samples were taken from the ditch (outside the nursery), Hog Creek (about 100 feet downstream from the confluence of the ditch and Hog Creek), or both.
- It is announced that *P. ramorum* is confirmed in Serbia for the first time. In 6/08, *P. ramorum* symptoms were observed on 12 *Rhododendrons* in an open garden. Symptomatic leaves and petioles were sampled and confirmed positive. The infected plants were destroyed and measures taken to eradicate the pathogen according to European Union standards.

1/09

- Washington State confirms two *P. ramorum*-positive residential landscape finds. Both are the result of trace-forward inspections. The positive plants found at both locations are *Rhododendrons*.
- *Choisya ternate* (Mexican orange) and *Ribes laurifolium* are found *P. ramorum* positive after sampling plants with foliar dieback symptoms at a UK nursery. APHIS will add these species to the federally regulated list of *P. ramorum* associated hosts.

10/08

- China's General Administration of Quality Supervision, Inspection, and Quarantine implements "Phytosanitary Requirements for the Import of Host Plants of *Phytophthora ramorum* from Regulated Areas." Regulatory agencies for the exporting countries must provide China with a list of approved registered nurseries. The new requirements include assuring all *P. ramorum* host plants are from nurseries free of the pathogen, and also call for laboratory testing by regulatory agencies prior to host exportation to ensure absence of the pathogen. The host plant growing media will also be subject to disinfection treatment measures such as heat treatment prior to exportation to China.

8/08

- Kousa dogwood (*Cornus kousa*) is added to the federal list of hosts regulated for *P. ramorum*.

7/08

- *P. ramorum* is confirmed in the Little River at Van Damme State Park in Mendocino County near the town of Mendocino. Taken from March water baiting samples, the positive cultures represent the northern most detection of the pathogen in the County.

6/08

- The Big Sur Basin Complex fire is burning in areas with elevated fuels due to SOD mortality. To date, most of the burn area has contained older dead trees; however, the fire is moving north toward Palo Colorado and vicinity where more recent SOD mortality has occurred. The fine fuels from attached leaves on these recently killed trees can increase the difficulty of fire suppression.
- The US Fish and Wildlife Service pre-approves SOD eradication (up to 250 acres per agency per year for the next 5 years) on USFS and BLM northern spotted owl and marbled murrelet lands in SW Oregon. This will allow agencies to respond to infested sites more quickly.

5/08

- WSDA confirms *P. ramorum* in the Sammamish River. This site was also positive in 2/08 as well as 2007.
- An 80-acre fire along Saint Helena Road in Napa County ignites when the green stem of a coast live oak with Sudden Oak Death fell onto a power line. Approximately \$100,000 is spent for suppression.
- An OR landscape site is found with *P. ramorum*-positive *Rhododendron*. Delimitation surveys are underway. The infected plant was purchased from a positive OR nursery earlier this year.
- *Cercis chinensis* (Chinese redbud) and *Magnolia (Michelia) figo* (banana shrub) are added to the USDA APHIS *P. ramorum* list of federally regulated plants. *Cercis chinensis* was found positive at a previously positive British Columbia nursery on November 16, 2007. The *Magnolia figo* was found during a compliance agreement inspection at a Contra Costa County, CA nursery.

4/08

- WSDA reconfirms *P. ramorum* in the Rosedale Stream (found positive in 2007) at a new confluence in a field below a previously *P. ramorum*-positive nursery.
- USDA APHIS adds *Magnolia denudata x salicifolia* (Magnolia), *Magnolia kobus* (Kobus magnolia), *Magnolia salicifolia* (Anise magnolia), *Magnolia x thompsoniana* (Magnolia), and *Magnolia liliiflora* (Purple magnolia) to the list of *P. ramorum* federally regulated plants.
- Additional foliage samples are taken for analysis from native trees and shrubs along the ditch outside of the MS nursery on 4/29. Results from both isolation attempts and molecular tests are negative for *P. ramorum*. Follow-up water samples inside and outside the nursery perimeter are also negative. Additional sampling will be conducted in the fall and following spring.
- A MS survey is conducted on 4/1 of the nursery-ditch site previously found positive. All vegetation samples collected outside of the nursery (samples were taken from higher ground than previous samples due to flooding) are negative. Water samples collected from the ditch on nursery property are positive.

3/08

- A PCR *P. ramorum*-positive stream bait sample is obtained from the MS ditch (previously found with PCR-positive willow); however, isolations are negative. Follow-up monitoring efforts continue.
- *P. ramorum* is confirmed in a Harris County, Texas landscape setting. The confirmation is made during trace-forward investigations resulting from a *P. ramorum*-positive Southern California nursery. The positive *Camellia* sp. planted in the Texas yard was removed and destroyed. To date, follow-up landscape soil sampling results have been negative.

2/08

- WSDA reconfirms *P. ramorum* in the Sammamish River at the original 2007 positive site.

1/08

- Oregon's Curry County quarantine area is officially expanded to 162 square miles, following the State's amendment to their *P. ramorum* quarantine. For the first time, nurseries and a lumber mill are located within the quarantine area. ODA is working with affected businesses to set up the compliance agreements and inspection schedules necessary to meet federal interstate shipping requirements.

12/07

- Water baiting efforts from a ditch (that drains into a creek) outside of a nursery in Jackson, MS result in nested and real-time PCR positives. A supplemental vegetation survey of the ditch vicinity leads to nested and real-time PCR positives of willow. Due to possible surface contamination of the samples by silt from flooding prior to collection, further regulatory action is not yet being taken. Follow-up sampling is being conducted.
- *Corylopsis spicata* (spike witch hazel - Hamamelidaceae) and *Physocarpus opulifolius* (ninebark - Rosaceae) are added to the list of federally regulated associated host plants. The CFIA found both plants naturally infected in a BC, Canada nursery. Spike witch hazel symptoms were identified as leaf necrosis and ninebark symptoms included leaf necrosis and dieback.

11/07

- ODA publishes a notice to amend the state quarantine for *P. ramorum* and the regulated area for nursery stock. The proposed amendments include increasing the Curry County *P. ramorum* quarantine area to 166 square miles (including five newly detected sites outside of the existing quarantine area) and it would harmonize the state's *P. ramorum* rules with current federal regulations and protocols.

10/07

- *P. ramorum* inoculum was baited from Norton Creek (a small coastal stream in northern Humboldt County in the town of McKinleyville) early in the summer of 2006, with a repeat detection in the spring of 2007. The recovered isolates have been genotyped, revealing that two lineages are present: the Northern American (NA1) and European (EU1). This is the first find in North America of the EU1 lineage in a wildland environment. Efforts are being made to determine the spore source location, including exhaustive streamside surveys. A small retail nursery in downtown McKinleyville has been found to have *P. ramorum*-positive plants, including three plants confirmed with the EU1 strain, but the nursery is located in a different watershed than the

infested stream. No definitive linkages between the nursery and stream have been established.

9/07

- *Garrya elliptica* and *Mahonia aquifolium* are now regulated by the USDA APHIS for *P. ramorum*. Nurseries operating under a compliance agreement may continue to ship hosts and associated plants, including the newly listed plants. However, all other nurseries containing these newly listed plants must be properly inspected, sampled, tested, and placed under a Compliance Agreement by September 7, 2007 in order to be able to move regulated plants interstate.

8/07

- The EU implements changes to their *P. ramorum* regulations. The decision amends the list of plants, wood, and bark susceptible to *P. ramorum*; increases from one to two the number of official inspections of specific species of susceptible plants in places of production and extends eradication measures to cover growing media and plant debris as well as sanitizing the surface upon which infected plants have been standing.

7/07

- Rhododendrons planted along a residential roadway are found *P. ramorum* positive in Thurston County, WA. WSDA has implemented the landscape protocol; all rhododendrons along the roadway have been destroyed. The positive plants were provided to the landscaper from an out of state West Coast nursery.

6/07

- Following the April *P. ramorum*-positive stream baiting sample taken from the Sammamish River in King County, WA, WSU and WSDA collaborated with USDA ARS to genotype 40 isolates sampled from 12 nurseries both within and outside the Sammamish watershed in an attempt to trace the origin of the river isolate. Upon analysis, the Sammamish River isolate has a unique fingerprint that matches an isolate from a landscape supplier located outside of the watershed. While not a conclusive study, the finding does suggest the Sammamish River isolate may have been introduced from nursery stock originating from this wholesaler.
- Oregon Grape (*Mahonia aquifolium* [Pursh] Nutt. - Berberidaceae Family) is found *P. ramorum*-positive for the first time at a Canadian nursery. Symptoms are primarily foliar, and include leaf spots and discoloration. This host species is native to the West Coast of the US. APHIS is reviewing the findings and anticipates adding Oregon Grape to the list of *P. ramorum*-regulated hosts soon.

5/07

- The MS Forestry Commission, MS Department of Agriculture, USDA FS, and USDA APHIS develop a follow-up survey plan in response to the *P. ramorum* water baiting confirmation made in MS last month. The plan includes immediately implementing stream baiting, soil baiting around the edge of the waterway where the positives were obtained, and vegetation surveys. These same survey activities will be repeated in the fall.

4/07

- The 2007 National *P. ramorum* Early Detection Stream Baiting Survey for Forests has recovered two *P. ramorum*-positive samples. One of the positive recoveries is from WA state and one from MS. The positive western WA river sample was recovered downstream from several confirmed nurseries. The source of the inoculum has not been determined. The MS confirmation was made from a ditch draining a *P. ramorum*-positive nursery. The pathogen has not been detected in vegetation outside the nursery.
- OR has removed all tanoak and evergreen huckleberry within the treatment boundary established as a result of the new outbreak identified in March 2007. Piles will be burned as soon as conditions are appropriate.

3/07

- OR has identified a new *P. ramorum* outbreak that is approximately 1.5 miles north of their current quarantine area. The site was detected during ground-based surveys being conducted as a follow-up to a *P. ramorum*-positive water baiting sample.
- The European *P. ramorum* lineage has been reported for the first time in CA. It was recovered from three Humboldt County nursery isolates taken in spring of 2006 and analyzed as part of a genetic study of *P. ramorum* isolates from CDFA. Current samples have been taken at the nursery; results are pending. Trace-back investigations are underway for the 2006 confirmations.
- ODA increases the size of OR's quarantine area to 24.25 sq. mi. following recent discoveries of new *P. ramorum* infection centers in Curry County. There are now three areas under quarantine: two small satellite infection areas that are 1 sq. mi. each in size and the original area that has increased to 22.25 sq. mi. Eradication efforts are ongoing in all three quarantine areas.

2/07

- Sixteen silk tassel bush (*Garrya elliptica*) plants are found *P. ramorum*-positive for the first time in the UK. This host species is a West Coast US native. APHIS is reviewing the findings and anticipates adding silk tassel bush to the *P. ramorum*-regulated host list soon.
- The new USDA APHIS *P. ramorum* regulation "*Phytophthora ramorum*; Quarantine and Regulations" is published February 27, 2007 in the Federal

Register. This rule primarily codifies the Federal Order issued in December 2004 that established restrictions on the interstate movement of nursery stock from nurseries in nonquarantined areas in CA, OR, and WA. The rule also incorporates all updates (SPROs) issued since the original APHIS regulation was published in 2002, most of which are updates to the host list.

1/07

- The Tiffany Creek Preserve in Nassau County, NY is officially confirmed *P. ramorum*-free. One PCR *P. ramorum*-positive red oak forest find was made at the Preserve in 2005. With all findings remaining negative, the area is now officially considered *P. ramorum*-free and will no longer fall under regulatory scrutiny.
- The UK finds *Schima wallichii* (Chinese guger tree) to be a new *P. ramorum* host. The symptomatic foliar samples were taken outdoors from a historic garden near Cornwall in 2006. USDA APHIS is reviewing the findings and anticipates adding Chinese guger tree to either the host or associated host list soon.
- *P. ramorum* continues to spread in Mendocino County with new detections north of Elk. Sudden Oak Death is now present in patches along the Highway 128 corridor from Highway 101 west, to within 4 miles of the Pacific Ocean.
- The USDA FS, Forest Health Protection, Pacific Southwest Region has published their "2006 Accomplishment Report: Aerial and Targeted Ground-Based Monitoring for Sudden Oak Death." In 2006, crews confirmed 10 new *P. ramorum* detections - 9 in southern Mendocino County and 1 in southern Monterey County. There were no detections in Del Norte, San Benito, San Luis Obispo, or Santa Barbara Counties, nor were there detections in the northern parts of Mendocino and Humboldt Counties.
- Two new *P. ramorum* A2 isolates from the EU lineage are identified in Belgium. Both new isolates originated from nurseries in northern Belgium from two separate sites and from different hosts (*Rhododendron* and *Viburnum*). One isolate was from a 2002 survey, and the other from a 2003 survey. The isolates were found during a screening of 257 isolates collected between 2002 and the end of 2005.

12/06

- In 2006, 35 new *P. ramorum*-infested sites (139 infected tanoak trees) were discovered in Curry County, OR. This is the highest number of detections since the eradication effort began in 2001. Two of the new sites occurred outside of the quarantine zone, with each site more than 2 miles from a known infestation. The largest new site covered 10 acres and contained more than 40 infected trees. In addition to the new sites, six existing eradication sites have been expanded to include infected trees that were found near their perimeters. All sites will be treated and the quarantine area will be expanded.

- In 2006, USDA APHIS reported 62 sites in 11 states as having had nursery-related *P. ramorum* detections. Positive findings by state are: AL(1), CA(28), CT(1), FL(2), GA(1), IN(1), ME(1), MS(1), OR(13), PA(1), and WA(12).
- The USDA Forest Service "2006 National *P. ramorum* Early Detection Survey for Forests" was conducted in 36 states. Of the 1,044 locations surveyed nationwide, 607 were nursery perimeter locations and 437 were general forest locations. All of the 4,016 samples processed were negative for *P. ramorum*.
- USDA FS national water monitoring survey protocols were pilot tested during 2006 in 93 watersheds in 11 states. WA became the first state using national survey protocols to detect *P. ramorum* in a stream not known to be infested. The intermittent stream flowed through a woody ornamental nursery that had previously been confirmed *P. ramorum*-positive. Follow-up terrestrial surveys up- and downstream found no infection of forest vegetation.

11/06

- UC Cooperative Extension (Valachovic and others), CDF, and CSP finish burning 45 acres of public and private land, closing out the 2006 experimental silvicultural treatment for managing the spread and persistence of *P. ramorum* in southern Humboldt County.

9/06

- Researchers report that sequencing the *Phytophthora sojae* and *P. ramorum* genomes has revealed that these *Phytophthoras* have an unprecedented number of genes and genetic flexibility compared to fungal pathogens. Results also indicate that these pathogens have a large arsenal of recently acquired proteins, such as toxins, protein inhibitors, and enzymes that likely enable them to debilitate a host plant's immune system during infection and then kill and destroy plant tissue later on in the infection process. Studies disclosed that nearly half of the genes are undergoing rapid adaptation, likely as a result of pressure from the host plants' defense systems.
- Koch's postulates are completed for: *Acer pseudoplatanus*, *Aesculus hippocastanum*, *Laurus nobilis*, and *Michelia doltsopa*. Consequently, these hosts will be reclassified from the APHIS "Plants Associated with *P. ramorum*" list to the list of "Proven Hosts Regulated for *P. ramorum*."
- The FS and states are conducting nursery perimeter and general forest detection surveys. To date, 567 nursery perimeter surveys have been conducted in 29 states, with 1,498 samples collected. Additionally, 320 general forest surveys have been conducted in 29 states, with 765 samples collected. To date, all samples tested have been found negative for the pathogen.

8/06

- *Ceanothus thyrsiflorus*, *Cinnamomum camphora*, *Kalmia angustifolia*, *Nerium oleander*, *Osmanthus fragrans*, *Osmanthus heterophyllus*, and *Quercus acuta* are officially added to the APHIS list of regulated "Plants Associated with *Phytophthora ramorum*."
- *Fagus sylvatica*, *Kalmia latifolia*, *Quercus cerris*, *Salix caprea*, and *Viburnum* spp. are transferred from the APHIS "Plants Associated with *P. ramorum*" list to the "Proven Hosts Regulated for *P. ramorum*" list, based on the completion of Koch's postulates.
- *Eucalyptus haemastoma* Sm. (Myrtle family), *Cornus kousa* x *Cornus capitata* (Dogwood family), and *Castanopsis orthacantha* Franchet (Beech family) are added to the UK DEFRA list of Plants Reported as Natural Hosts of *P. ramorum*. All three hosts were found *P. ramorum*-positive in the United Kingdom. APHIS is researching the findings and anticipates adding these plants to APHIS "Plants Associated with *P. ramorum*" list soon.
- Canada adds five new genera to the CFIA *P. ramorum* host list: *Loropetalum*, *Distylium*, *Manglietia*, *Parakmeria*, and *Ilex*. These additions are the result of positive confirmations from the species: *Loropetalum chinese*, *Distylium myricoides*, *Manglietia insignis*, *Parakmeria lotungensis*, and *Ilex purpurea*. APHIS is reviewing the findings and anticipates adding the new hosts to the APHIS "Plants Associated with *P. ramorum*" list in the near future.
- Researchers report findings of *P. ramorum* infecting Camellia flower buds. This is the first report of camellia flower bud infection in the field with the North American genotype of *P. ramorum*.

7/06

- Researchers report *P. ramorum* reduces xylem sapflow and specific conductivity of sapwood in mature tanoak. This is the first report that *P. ramorum* interferes with water conductance.
- Summer aerial surveys mapping oak and tanoak mortality in Mendocino, Humboldt, Del Norte, San Luis Obispo, western San Benito, and Santa Barbara Counties, as well as western Monterey County, are complete. In total, approximately 20,000 acres of mortality were mapped, 9,000,000 acres surveyed, and 6,667 miles flown. Follow-up ground-check surveys, are under way.

6/06

- Researchers report findings in Humboldt County of natural infection of tanoak seedling roots by *P. ramorum*. This is the first report that *P. ramorum* can be recovered from roots of naturally occurring forest vegetation.
- *Osmanthus fragrans* (sweet olive) and *Osmanthus heterophyllus* (false holly), are found *P. ramorum*-positive in a Humboldt County nursery. APHIS is

reviewing the findings and anticipates adding these new species to the APHIS *P. ramorum* associated host list in the near future.

- APHIS confirms *Nerium oleander* (Oleander) to be a new *P. ramorum*-associated host when delimitation survey samples from the Humboldt County facility are confirmed positive.
- The first *P. ramorum*-positive beech in the Netherlands is reported. Symptoms include stem bleeding. This is the first time a plant species native to the Netherlands has been identified with the pathogen. At both locations the affected beech are surrounded by heavily infected rhododendrons.

5/06

- *P. ramorum* is detected on dead tanoaks a few miles outside the OR quarantine area on OR State Parks and Rogue River-Siskiyou National Forest-administered lands near Brookings, OR. This is the first find of *P. ramorum* on USDA FS land in OR.

4/06

- The Government Accountability Office's report, "Invasive Forest Pests: Lessons Learned from Three Recent Infestations May Aid in Managing Future Efforts," (GAO-06-353, April 2006) is published. The report evaluates the federal response to three invasive forest pests: Asian longhorned beetle, emerald ash borer, and *P. ramorum*. The report can be accessed at: <http://searching.gao.gov/query.html?col=+&qt=+sudden+oak+death&charget=iso-8859-1&qf>.
- "Sudden Oak Death and *Phytophthora ramorum*: A Guide for Forest Managers, Christmas Tree Growers, and Forest Tree Nursery Operators in Oregon and Washington" is published and can be found online at: <http://extension.oregonstate.edu/catalog/pdf/em/em8877.pdf>.
- The USDA FS, PSW Research Station 2006 *P. ramorum* RFP process is complete. In total, 46 proposals seeking over \$5 million in research funds were received. However, due to limited funding, only nine projects were awarded, totaling approximately \$665,000.

3/06

- The first finding of *P. ramorum*-infected *Ceanothus thyrsiflorus* (blue blossom) is confirmed from southern Humboldt County, growing along the road within a *P. ramorum* treatment area in the lower Salmon Creek watershed. Symptomatic tissue includes leaves, stems, and shoot tips. USDA APHIS is reviewing the findings and anticipates adding *Ceanothus thyrsiflorus* to the federal *P. ramorum* host list soon.
- New Zealand issues a public notice addressing nursery stock importation concerns, including risk mitigation measures and the host list for *P. ramorum*. With the exception of high-value plants for which the risk of *P. ramorum* is

mitigated, 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. The proposed date of adoption and enforcement is May 29, 2006.

- Taiwan, Penghu, Kinmen, and Matsu issue a public notice proposing a draft amendment of the "Quarantine Requirements for the importation of plants or plant products." Among the changes is the designation of *P. 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 include: Belgium, British Channel Islands, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, UK, BC, CA, FL, GA, OR, and WA.

2/06

- A water sample taken from a seasonal stream in Pierce County, WA is confirmed *P. ramorum*-positive. Plants from the adjacent nursery tested positive in 2004 and 2005. Agencies are monitoring the water upstream and downstream from the positive site to determine the extent of water contamination. Monitoring for signs of infestation throughout the immediate watershed area outside of the nursery will also be conducted.
- APHIS issues a SPRO Letter, adding 13 new plant species to the federal *P. ramorum* associated host list. The SPRO can be found on the APHIS website under "Revision of Listed and Regulated Articles" dated 2/10/06 at: <http://www.aphis.usda.gov/ppg/ispm/pramorur/regulations.html>.
- Koch's postulates are completed for *Frangula purshiana* (formerly listed as *Rhamnus purshiana*), *Adiantum aleuticum*, and *Adiantum jordanii*. Consequently, APHIS reclassifies these associated hosts as hosts.
- *Acer circinatum* and *Arctostaphylos columbiana* samples from Humboldt County are confirmed *P. ramorum*-positive via culturing. APHIS is reviewing the findings and anticipates adding these two species to the host list in the near future.

1/06

- California's southern Humboldt County *P. ramorum* experimental treatment and suppression project begins on CA State Parks property along the Avenue of the Giants. The project includes the removal of infected tanoak, CA bay laurel, and madrone trees, as well as the pruning of coast redwood trees in a 50-acre area.
- Canada notified the US of 5 new genera of nursery plants found in BC to be infected with *P. ramorum*. The new host genera under Canadian regulation since December include: *Ardisia*, *Euonymus*, *Gaultheria*, *Osmanthus*, and *Prunus*.

- The Canadian nursery industry intensifies their *P. ramorum* Nursery Certification Program, which includes annual sampling and testing, training, and independent audits, as well as more rigorous BMPs to be implemented by August 2006.
- The first 2006 *P. ramorum*-positive California nursery is identified during a compliance agreement inspection. The find was made on a *Camellia japonica* in a Los Angeles County production nursery that only sells plants to local landscapers and does not ship plant material. CNP is underway at the facility. This nursery was also found *P. ramorum*-positive during last year's compliance agreement inspection, and had completed CNP in May 2005.

12/05

- In 2005, USDA APHIS reported 99 sites in seven states have had nursery-related *P. ramorum* detections. Positive findings by state are: CA(55), GA(4), LA(2), OR(20), TN(1), SC(1), and WA(16).

11/05

- The 2006 Agriculture appropriations bill is passed by the Senate, and includes \$3,076,000 for *P. ramorum* detection, monitoring, control, and eradication, as well as \$98,000 for disease research being conducted at UC Davis. The bill now goes to the President for final approval. (These appropriations only include USDA APHIS, ARS, and CSREES funding allotments.).
- *P. ramorum* is first detected from California red fir (*Abies magnifica*) symptomatic shoots at a Christmas tree farm near Los Gatos, CA.
- The state-funded CA SOD Hazardous Tree Removal Program comes to a close. In all, approximately 4,020 trees were removed under the contract for a cost of \$1,503,645, averaging \$374 per removal.

10/05

- A new *P. ramorum*-infested site in Humboldt County has been confirmed 6 miles north of the Garberville/Redway area on Humboldt Redwoods State Park property along the Avenue of the Giants.
- Results of the 2005 western North Carolina pilot stream sampling project found fifteen different *Phytophthora* species in monthly samplings between 4/05 and 8/05. *P. ramorum* was not detected, although sampling will continue through November. A 2005 monthly stream baiting pilot project in 10 Washington state streams also detected no *P. ramorum*.
- In spring of 2005, ODA surveyed 103 Christmas tree plantations planted in *Abies* spp. and *Pseudotsuga menziesii* for *P. ramorum*. Christmas tree plantations in 22 Oregon counties were surveyed; *P. ramorum* was not detected in any of the samples.

- To date, the United Kingdom has found *P. ramorum* in rivers and streams near some outbreak sites, as well as at 475 sites in England and 34 sites in Wales, in addition to a number of sites in Scotland, Northern Ireland, and the Channel Isles. England's totals include 380 retail and nursery confirmations, in addition to 95 established gardens, woods, and other wild planting areas. Wales' totals include 26 retail and nursery confirmations along with eight established gardens, woods, and other wild planting areas.
- The 2005 National *P. ramorum* Survey of Forest Environments results to date include surveys at 519 nursery perimeter locations and 472 forest locations with 2,038 submitted samples. As of 10/31, all samples have been negative for *P. ramorum*.
- *Viburnum opulus* (= *V. trilobum*) - (American cranberry viburnum) was found to be *P. ramorum*-positive at a nursery in Clackamas County, Oregon on 6/6/05. USDA APHIS has reviewed the findings and expects to add American cranberry viburnum to the *P. ramorum* associated host list soon.
- Real-time PCR is validated by USDA APHIS PPQ CPHST for providing diagnostic determinations for the *P. ramorum* federal emergency program.

9/05

- CDFA confirms the detection of *P. ramorum* on *Abies concolor* (white fir) at a Christmas tree farm in the quarantined county of Santa Clara, CA. This is the first report of the pathogen on this species of *Abies*. Koch's postulates have not been completed. USDA APHIS has reviewed the CDFA data and expects to add *A. concolor* to the official list of associated host plants soon.
- The California Sudden Oak Death/*P. ramorum* National Wildland Survey is complete. Detection surveys in areas identified as moderate to high-risk for infection in eastern Butte and Yuba Counties were conducted. *P. ramorum* was not detected.
- USDA issues a strategic plan for *P. ramorum*, titled: "Plant Diseases Caused by *Phytophthora ramorum*: A National Strategic Plan for USDA." The report addresses Department goals for *P. ramorum* detection, control, management, research, and restoration programs.
- USDA APHIS issues an updated State Plant Regulatory Official Letter, adding *Acer laevigatum* (Evergreen maple), *Michelia doltsopa* (Michelia), and *Quercus petraea* (Sessile oak), *Adiantum aleuticum* (Maidenhair fern), *Fraxinus latifolia* (Oregon ash), *Osmorhiza chilensis* (Sweet Cicely), *Torreya californica* (California nutmeg), and *Vancouveria planipetala* (Redwood ivy) to the list of associated host plants regulated for *P. ramorum*. The addition of these eight plants brings the list of regulated *P. ramorum* host and associated hosts to 83.

8/05

- The 2005 *Phytophthora ramorum* Humboldt County aerial, ground, and stream survey efforts reveal disease intensification and spread in southern Humboldt County, with at least 21 square miles now infested.
- APHIS receives information on three new *P. ramorum*-infected plants from the UK. *Acer laevigatum* (Evergreen maple), *Michelia doltsopa* (Michelia), and *Quercus petraea* (Sessile oak) were found in outdoor, green areas with natural infection. Koch's Postulates have not been completed; these plants will join the APHIS associated host list.
- Five new *P. ramorum* hosts are identified in California's quarantined county forests. The newly confirmed *P. ramorum*-susceptible plants are: *Adiantum aleuticum* (Maidenhair fern), *Fraxinus latifolia* (Oregon ash), *Osmorhiza chilensis* (Sweet Cicely), *Torreya californica* (California nutmeg), and *Vancouveria planipetala* (Redwood ivy). Koch's Postulates have not been completed; these plants will be added to the APHIS associated host list.
- APHIS issues an updated State Plant Regulatory Official (SPRO) Letter, adding eight new associated host plants and two new host plants to the list of plants regulated for *P. ramorum*. The addition of these 10 plants brings the list of regulated *P. ramorum* host and associated hosts to 75. To refer to the SPRO, go to: <http://www.aphis.usda.gov/ppq/ispm/pramorom/>.
- Six hosts are moved from the associated host list to the host list, with all having Koch's Postulates complete and having been approved by APHIS. The six newly classified hosts are: *Castanea sativa*, *Fraxinus excelsior*, *Quercus falcata*, *Quercus ilex*, *Syringa vulgaris*, and *Taxus baccata*.
- *P. ramorum* federal order compliance agreements, trace-forward/-back investigations, the USDA APHIS National Nursery Survey, and other investigations are ongoing. For 2005, 91 nursery-related sites in seven states have had *P. ramorum* detections. Positive findings by state are: CA(53), GA(4), LA(2), OR(20), TN(1), SC(1), and WA(10).

7/05

- The first *P. ramorum*-infected *Taxus media* is reported from the Netherlands, making it the third type of yew to be identified as *P. ramorum*-susceptible. Koch's postulates have not been completed; this plant has been added to the APHIS list of *P. ramorum* associated host plants.

6/05

- The SODBusters Pilot Project, which organized and implemented two collection yards for *P. ramorum* host material in Marin and Santa Cruz Counties, officially ends June 30, 2005.

- The first *Phytophthora ramorum* caused cankers on *Taxus brevifolia* (Pacific yew) are identified on a tree in Mendocino County.
- *P. ramorum* is recovered from symptomatic tissues of California maidenhair fern (*Adiantum jordanii*) and spice bush (*Calycanthus occidentalis*) collected at Jack London State Park, Sonoma County, CA. Pending the review of laboratory results by CDFA and USDA APHIS, these hosts will be added to the associated host list.
- USDA FS PSW is funding 12 of 40 proposals submitted during the FY'05 USDA PSW *P. ramorum* Request for Proposals, resulting in \$800,000 in allocations during this funding cycle.
- USDA APHIS publishes a [final rule amending treatment regulations for California bay laurel](#) (*Umbellularia californica*) leaves to include vacuum heat as a treatment option for leaves moving interstate from an area under *P. ramorum* quarantine.

4/05

- APHIS confirms the presence of *P. ramorum* on an OR jasmine plant sample. As a result, ODA, APHIS, and others are working to determine jasmine's status as a host of *P. ramorum*.
- OR reports four trace-forward positives in residential settings. The residential finds originated at a nursery found positive in 2004. Delimitation surveys confirmed the disease has apparently not spread to other plants already in the landscapes. Infected plants have been removed and incinerated.
- The first *P. ramorum*-positive *Acer pseudoplatanus* (Planetree maple) is confirmed at a *P. ramorum* woodland garden site in Cornwall, UK. Pending USDA review and approval, it will be added to the US list of *P. ramorum*-regulated plants.
- The UK completes Koch's postulates on: sweet chestnut (*Castanea sativa*), Holm oak (*Quercus ilex*), and European ash (*Fraxinus excelsior*). Following USDA review and approval, plants will be moved to the US *P. ramorum* host list.
- The [CFIA issues an updated *P. ramorum* directive 3/1/05](#), superseding the 9/25/03 order in response to the USDA APHIS 12/21/04 Emergency Order. USDA APHIS is provided \$9.5 million in emergency funds through the USDA CCC to help support *P. ramorum* regulatory activities in 2005.

3/05

- USDA APHIS has changed its *P. ramorum* website address to <http://www.aphis.usda.gov/ppq/ispm/pramorom/> in order to refer to the site by the pathogen's name, rather than Sudden Oak Death, which only represents one of the diseases caused by *P. ramorum*.

- Both the APHIS PPQ Beltsville National Plant Germplasm and Biotechnology Laboratory (NPGBL) and the CDFA laboratory in Sacramento have encountered a *Phytophthora* species that inconsistently produces bands similar to that produced by *P. ramorum* when using nested PCR. The new species is being temporarily referred to as *Phytophthora* "azalea." Based on morphology and partial ITS sequence, the newly identified species is not a strain or subspecies of *P. ramorum*.

2/05

- APHIS proposes an amendment to the PPQ Treatment Manual that would allow California bay laurel leaves to be treated with vacuum heat before being moved interstate from any area under *P. ramorum* quarantine, providing an alternative to the currently approved hot water dip.

1/05

- DEFRA identifies six new plants associated with *P. ramorum*: *Griselinia littoralis* (NZ privet), *Hamamelis mollis* (Chinese witch-hazel), *Magnolia stellata* (star magnolia), *Magnolia x loebneri* (Loebner magnolia), *Magnolia x soulangeana* (saucer or Japanese magnolia), and *Parrotia persica* (Persian Parrotia or iron tree). It is anticipated that APHIS will soon be adding these species to their official *P. ramorum* associated host list.
- The [Second Sudden Oak Death Science Symposium](#), held in Monterey, CA, is attended by 350 people, and includes 80 formal presentations and 47 posters. While wildland issues and *P. ramorum* epidemiology continue to be areas of interest at the Symposium, increased areas of emphasis from the 2002 symposium include nursery issues, soil considerations, and pathogen and host genetics.
- [H.R. 4569](#) (Burns, GA), calling for a national plan for the control and management of Sudden Oak Death, is signed into law, directing the Secretary of Agriculture, through USDA APHIS, to develop the plan in consultation with other federal agencies. Funding is not included in the Bill.
- A previously identified *P. ramorum*-positive nursery in Los Angeles County, CA has found new infection on a camellia. Identifying one symptomatic plant, leaf samples were taken and cultured on-site. Following CDFA's review and confirmation of the nursery's sample, the USDA's CNP has been implemented. Trace-forward information has been submitted for follow-up investigations.

12/04

- USDA APHIS issues an [emergency federal order](#) for nurseries that takes effect on 1/10/05, superseding the 4/22/04 emergency order. The new order regulates the interstate movement of all plants from all nurseries in CA, OR, and WA to help prevent the spread of *P. ramorum* to uninfested areas of the US.

- With the issuance of the new USDA APHIS emergency *P. ramorum* order, Canada will rescind regulations on cut flowers (including roses) implemented as a result of the *P. ramorum* nursery infestations in March 2004. With the new federal order in place, Canada will accept any material leaving CA, OR, or WA that is in compliance with the US rules.
- False Solomon's seal (*Maianthemum racemosum*, formerly *Smilacina racemosa*), *Calluna vulgaris* (Scotch heather), and *Photinia fraseri* (Red tip photinia) are moved from the APHIS associated host list to the host list, due to the completion of Koch's postulates for each species.
- USDA APHIS adds *Fraxinus excelsior* (European ash) and *Nothofagus oblique* (Roble beech) to the federal *P. ramorum* regulation, based on detection and confirmation in the UK, where *P. ramorum* was found infecting the boles of these species.
- In 2004, there have been 177 USDA APHIS confirmed positive *P. ramorum* sites in 22 states from trace-forward, national, and other surveys. The breakdown per state is: AL(3), AR(1), AZ(1), CA(55), CO(1), CT(3), FL(6), GA(16), LA(5), MD(3), NC(9), NJ(1), NM(1), NY(1), OK(1), OR(24), PA(2), SC(4), TN(2), TX(11), VA(2), and WA(25).

11/04

- Omnibus appropriations for federal *P. ramorum* funding in 2005 total \$9.89 million. The Agricultural Appropriations Bill earmarked \$1.45 million for ARS; \$94,000 for CSREES; and \$3 million to APHIS. The Interior Appropriations Bill earmarked \$2 million to USDA FS Cooperative Lands Forest Health Management and \$2.5 million to USDA FS Forest and Range Land Research.
- ODA receives and approves a revised federal label for the use of Agrichem's Agri-Fos® (11/22/04, EPA Registration #71962-1) on landscape, golf course, nursery, forestry, and park sites for *Phytophthora* and Pythium diseases, including Sudden Oak Death.
- The federal "Confirmed Residential Protocol for *Phytophthora ramorum* Detections in Landscaped Residential or Commercial Settings" is posted to the [USDA APHIS PPQ](#) website.

10/04

- To date, the USDA FS *P. ramorum* Nursery Perimeter and General Forest Survey has sampled 620 nursery perimeter locations in 32 states. Of the 2,454 samples submitted, all were *P. ramorum*-negative. 404 general forest locations in 18 states have also been surveyed, with 1,249 samples submitted. Of those submitted, two confirmations from CA's Golden Gate Park in San Francisco County tested *P. ramorum*-positive.
- The USDA APHIS PPQ *P. ramorum* National Nursery Survey activities are complete in 38 states and Puerto Rico. To date, participating states

throughout the US have surveyed 3,095 sites and have collected 50,820 samples. Fifteen survey sites have been confirmed positive.

- UK Minister for Plant Health and Forestry Ben Bradshaw announces [conditional financial assistance](#) for nurseries suffering hardships related to actions taken to protect the wider UK environment from *P. ramorum*.
- Seven new *P. ramorum* infested areas are detected in Humboldt County a few miles from the Redway suppression area. Suppression projects are planned for these new finds. *P. ramorum* is also recovered from the South Fork of the Eel River, approximately 8 km downstream from the Redway suppression area.

9/04

- CDFA announces the confirmation of two *P. ramorum*-infected coast live oak trees in Golden Gate Park, making San Francisco County the 14th CA county under *P. ramorum* quarantine.
- WSDA begins testing symptomatic and asymptomatic plants coming into the state before unloading shipments in an effort to prevent new *P. ramorum* introductions on host nursery stock.
- The National Plant Quarantine Service, Ministry of Agriculture and Forestry, Republic of Korea modifies its "Tentative phytosanitary measures to prevent the introduction of Sudden Oak Death Disease." Updates to the regulation include the addition of Nassau County, NY, as well as 22 new plant species. These emergency measures prohibit the importation of any propagative host material, such as nursery stock and cuttings, as well as wood (with bark) and growing media from the prohibited areas.

8/04

- APHIS adds *Calluna vulgaris* (Scotch Heather), *Drimys winteri* (Winter's-bark), *Laurus nobilis* (Sweet bay laurel), and *Salix caprea* (Kilmarnock willow) to the *P. ramorum* associated host plant list.
- APHIS removes *Vaccinium vitis-idaea* (lingonberry) from the *P. ramorum* associated host plant list because the Plant Protection and Seed Service of Poland is unable to validate their original association of lingonberry with *P. ramorum*.

7/04

- Mexico is considering quarantining Douglas-fir (*Pseudotsuga*) and fir (*Abies*) Christmas trees from areas of the US with *P. ramorum* to prevent introduction of the pathogen into Mexico. and Markets.
- CAN files a federal suit against KY, charging the state with violating federal law by banning the importation and sale of CA's *P. ramorum* host and associated plants. The lawsuit is based on a provision in the federal Plant

Protection Act that gives the USDA authority over interstate plant movement. A federal district judge for the [Eastern District of KY signs a consent decree](#) on 7/30 permanently enjoining KY from having *P. ramorum* regulations that are inconsistent with the federal standard.

- The first finding of *P. ramorum* in a Switzerland nursery has been confirmed on viburnum.

6/04

- A PCR-positive *P. ramorum* sample from Nassau County, NY is confirmed by USDA APHIS. Follow-up surveys are being conducted by a team from the USDA's FS and APHIS, as well as the New York Department of Agriculture and Markets.
- US Senators Barbara Boxer (D-CA) and Gordon Smith (R-OR) introduce the Sudden Oak Death Syndrome Control Act of 2004 (S.2575). If passed, the Act would authorize \$44.2 million annually, including \$25 million for USDA research, regulations, and monitoring; \$18.5 million for management, treatment, and fire; and \$700,000 for education and outreach.
- *Clintonia andrewsiana* (Andrew's clintonia bead lily), *Dryopteris arguta* (California wood fern), *Smilacina racemosa* (false Solomon's seal), and *Taxus brevifolia* (Pacific yew) are added to the APHIS *P. ramorum* associated host list.
- The US DOE Joint Genome Institute and the Virginia Bioinformatics Institute announce the completion of the DNA sequencing of *Phytophthora ramorum* and *Phytophthora sojae* (a soybean pathogen). The new information will provide a foundation for future diagnostics, in addition to safe and effective applications for use in disease treatment and/or control. Sequencing information can be found at <http://genome.jgi-psf.org/ramorum> and at <http://genome.jgi-psf.org/sojae/>.
- To date, 140 nurseries in 18 states have had *P. ramorum* detections. Positive findings by state are: CA(45), AL(3), AR(1), FL(6), WA(18), OR(9), TX(10), CO(1), GA(13), LA(6), MD(2), NC(9), NM(1), TN(2), PA(1), NJ(1), SC(1), and VA(1). In all, 787,842 plants have been destroyed. Fourteen states are still imposing quarantine regulations on CA beyond those ordered by APHIS PPQ.
- USDA APHIS begins regulating *Camellia spp.* (including all species, hybrids, and cultivars) at the genus level.

5/04

- USDA transfers \$15.5 million from the CCC to APHIS PPQ to help halt the spread of *P. ramorum* to non-infested areas of the US. USDA PPQ has now committed a total of \$20 million to the program in fiscal year 2004. USDA PPQ will apply the funds to quarantine actions, nursery inspections, sampling and testing, and Sudden Oak Death education and outreach.

- Lake County is confirmed as the 13th CA county to have *P. ramorum* naturally occurring. As an infested county, Lake County will be added to the quarantine area.
- Fifteen states are currently implementing *P. ramorum* regulations beyond those issued by USDA APHIS.

4/04

- USDA APHIS issues an [amended emergency order](#) restricting the movement of CA nursery stock by requiring CA nurseries that ship *P. ramorum* [hosts or associated plants](#) interstate to be inspected by a regulatory official, sampled, and tested before shipping (see [Nursery Chronology](#)).
- CO, FL, GA, LA, MD, NC, NM TN, TX, VA have confirmations of *P. ramorum*-infested nursery stock shipments from the West Coast (see [Nursery Chronology](#)).
- AL, OR, and LA update their *P. ramorum* quarantines (see [Nursery Chronology](#)).
- Formosa firethorn (*Pyracantha koidzumii*) is added to the *P. ramorum* associated host list following a CFIA find at a Vancouver area nursery (see [Nursery Chronology](#)).
- UCB researchers confirm the susceptibility of wood rose (*Rosa gymnocarpa*) to *P. ramorum*; USDA APHIS adds it to the host list.
- San Joaquin and Butte Counties each have a *P. ramorum*-positive nursery confirmed.

3/04

- The federal government earmarks \$7.4 million in funding for *P. ramorum* in 2004. Funds are allocated as follows: \$1.5 million to the USDA ARS for research on horticultural aspects of *P. ramorum*, including \$250,000 for a new genomics research program at the UCD ARS laboratory for analysis of resistance to the pathogen; \$2 million to USDA APHIS for *P. ramorum* quarantine, enforcement, inspection, and monitoring; \$2 million to USDA Forest Service Research for research; and \$1.7 million to the USDA FS, State and Private Forestry, for management, monitoring, and education.
- *P. ramorum* is found at a large Los Angeles County, CA wholesale horticultural nursery. The pathogen was detected on several varieties of camellia plants as part of the National *P. ramorum* Nursery Survey. Trace-forward surveys for the past year's worth of shipments are underway (see [Nursery Chronology](#)).
- *P. ramorum* is confirmed via culture and PCR at a San Marcos, CA (San Diego County) mail order nursery. The survey was part of the California's National *P. ramorum* nursery survey. Trace-back surveys indicated infected camellias originated from the large Los Angeles County wholesale nursery found to be infested (see [Nursery Chronology](#)).

- The USDA APHIS PPO program announces a Sudden Oak Death hotline (1-888-703-4457). Specialists are staffing the APHIS Emergency Operations center in Riverdale, MD to handle nationwide calls from the nursery and landscape industry, news organizations, and the general public in response to positive *P. ramorum* confirmations in two Southern CA nurseries.
- WA issues an emergency order requiring nurseries receiving trees and plants from out-of-state to hold them for 24 hours until WDA is notified.
- AL, DE, MS, FL, GA, UT, TN, WV, LA, MT, VA, KY, and IN impose state-specific *P. ramorum* quarantines as a result of the Southern CA nursery confirmations (see [Nursery Chronology](#)).
- FL identifies three nurseries as having *P. ramorum*-positive plants (see [Nursery Chronology](#)).

2/04

- A *P. ramorum* slow-the-spread project in Humboldt County, CA is initiated with the removal and disposal of 77 infected California bay laurel trees in Redway.
- The Gordon and Betty Moore Foundation awards approximately \$2.5 million for *P. ramorum* research to Matteo Garbelotto, Richard Dodd, and Ellen Simms (UCB), and Dave Rizzo (UCD). The three-year grant covers control, resistance, genetics, epidemiology, and other *P. ramorum*-related topics.
- Canadian regulators add the *Hamamelis* and *Fagus* genera to the Canadian *P. ramorum* quarantine. The decision is in response to the UK confirmation of *P. ramorum* on witch hazel and European beech.
- ODA finalizes its interim rule requiring recipients of out-of-state tree and shrub nursery stock deliveries to notify ODA of the shipment within 24 hours for possible inspection of the plants.

1/04

- Six new hosts are added to the APHIS (7 CFR 301.92) and CDFA *P. ramorum* quarantine. 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); and *Hamamelis virginiana* (nursery stock, twigs, and leaves).
- *P. ramorum* is detected on *Rhododendron* v. Unique at a third WA nursery near Long Beach, Pacific County. The find came as the result of a King County, WA, nursery trace-back survey.

12/03

- *P. ramorum* is found infecting beech, southern and northern red oak, Holm oak, and horse chestnut trees in the Netherlands and UK. In the Netherlands, a single northern red oak (*Quercus rubra*) in a park tests positive for the pathogen. In the UK, a single infected southern red oak (*Quercus falcata*) is detected in Sussex, England. Additionally, at two sites in Cornwall, *P. ramorum* is detected on European beech (*Fagus sylvatica*), Holm oak (*Quercus ilex*) and horse chestnut (*Aesculus hippocastanum*). The beech and horse chestnut show bleeding from the bole, while leaf spots are present on the Holm oak. In all cases, the infected trees are located near *P. ramorum*-infected rhododendrons.
- A retail nursery in Gig Harbor, Pierce County, WA, is found to have *P. ramorum*-positive plants.

11/03

- Witch hazel (*Hamamelis virginiana*) is found to be susceptible to *P. ramorum*. UK DEFRA scientists discover the infected witch hazel in a public garden in Wales, close to *P. ramorum*-infected rhododendron. Koch's postulates have been completed.
- CDFA's revised enforcement guideline policy for CA's *P. ramorum* regulation goes into effect. The revisions allow unrestricted movement of host plants and most nursery stock within the quarantined counties. Nurseries within the quarantined area shipping out of the regulated area continue to be inspected.
- A new *Phytophthora* species (later named *P. kernoviae*) is identified by researchers at the UK Forestry Commission, Forest Research Agency, while looking for *P. ramorum* in natural settings. The positive isolates are from a large bleeding canker of a mature European beech tree in southwest England. It also affects rhododendron (*Rhododendron* spp.).

10/03

- The systemic fungicide AGRI-FOS(R) and Pentra Bark surfactant are approved by the California Department of Pesticide Regulation to treat individual oak and tanoak trees at high-risk of contracting *P. ramorum*.
- *P. ramorum* is found approximately 10 miles north of CA's San Luis Obispo County line near Plaskett Creek, extending the southernmost known infested area by about 15 miles.
- CA, OR, WA, the USDA, and Canada agree to [protocols to be used by USDA APHIS and the states to respond to new *P. ramorum* nursery detections](#) (outside of California's 12-county regulated area).

9/03

- *P. ramorum* was detected on two containerized *Camellia sasanqua* plants at a retail nursery in Placer County, CA. The finding is the result of a trace-forward investigation from a Stanislaus County, CA nursery.
- A European A2 *P. ramorum* mating type is found in Europe. European researchers identified the A2 *P. ramorum* mating type isolate from a Belgian nursery.
- Canada releases the [9th revision](#) of its *P. ramorum* regulations.

8/03

- *P. ramorum* is detected on containerized yew (*Taxus baecata*) saplings at a medium-sized garden center in northwest England.
- The European population, A1 *P. ramorum* mating type isolate is found for the first time in North America. Plants from sister nurseries in OR and WA were found to have both the North American, A2 mating type and the European population A1 mating type. This is also the first time both mating types have been found in close proximity to one another in the US.
- The [ODA adopts an emergency rule](#) that requires all recipients of out-of-state tree and shrub nursery stock to notify ODA of the shipment for possible inspection of the plants.

7/03

- ODA recalls camellia plants sold in OR that originated from a *P. ramorum*-positive nursery in Stanislaus County, CA.
- WA holds its first Sudden Oak Death informational meeting at Washington State University, Puyallup Research and Extension Center.
- A new diagnostic guide, "[Sudden Oak Death and Associated Diseases Caused by *Phytophthora ramorum*](#)" by Davidson et al., is published by the Plant Management Network, Plant Health Progress.
- CDFA issues a [Pest Exclusion Advisory](#) requiring incoming shipments of *P. ramorum* hosts and associated plants from OR, WA, and BC to be visually inspected by CA county inspectors at the destination location before being released for sale.

6/03

- *P. ramorum* is detected on rhododendron container plants at a nursery in King County, WA. This is the first detection of *P. ramorum* in the state.

- *P. ramorum* (European population, A1 mating type) is detected on a rhododendron container plant at a nursery in Greater Vancouver, BC.
- The Czech Republic implements a quarantine for *P. ramorum*-susceptible plants from the US, Germany, and the Netherlands.
- CDF approves the Santa Cruz County Hazard Tree Removal Program, granting the county \$224,000 to complete the removal of 650 previously identified hazardous trees this summer.
- *Camellia sasanqua* is found to have *P. ramorum* at a Sacramento County, CA nursery. It is intercepted via a trace-forward investigation.
- *P. ramorum* is detected on *Camellia sasanqua* container plants at two nursery locations in Jackson County, OR, as the result of trace-forward investigation from an infested Stanislaus County, CA nursery.

5/03

- "Sudden Oak Death, endangering California and Oregon forest ecosystems," a review article by Dave Rizzo (UCD) and Matteo Garbelotto (UCB), is published in the May 2003 issue of *Frontiers of Ecology and the Environment* (Ecological Society of America, issue 4, volume 1, May 2003).
- *P. ramorum* is confirmed on containerized *Viburnum bodanantense*, *Pieris japonica* and *Pieris japonica x formosa*, *Viburnum plicatum tomentosum*, and *Rhododendron 'Unique'* at a nursery in Clackamas County, OR.
- In a letter to USDA Secretary Anne Venneman, OR formally requests exemption from the interim federal regulations for *P. ramorum*. OR is requesting stricter regulations for *P. ramorum* to prevent pathogen spread into the state.
- *P. ramorum* is detected in four CA nurseries in Stanislaus, Alameda, Santa Cruz, and Marin Counties. The nursery in Stanislaus County is in the Central Valley, approximately 100 miles east of the closest known infested area.
- A Sudden Oak Death collection yard opens at the Marin Resource Recovery Center, San Rafael, CA. The project, dubbed "SODBusters," aims at preventing pathogen spread through proper handling, and disposal when necessary, of infested plant debris.

4/03

- A Sudden Oak Death Tribal Summit is held at Blue Lake Rancheria, Blue Lake, CA. The meeting brings together tribal and agency land managers, tribal members, and Sudden Oak Death researchers to discuss issues of particular concern to tribal members. Tribal research priorities, regulatory issues, and information needs are discussed.
- The on-line symposium "Sudden Oak Death - How Concerned Should You Be?" is hosted by the American Phytopathological Society. Over 3000 site

visitors from 46 countries participate.

- *Kalmia latifolia* and *Vaccinium vitis-idaea* are reported as susceptible to *P. ramorum* in the [revised pest risk assessment](#) for *P. ramorum* released by the UK.
- OR holds its first statewide informational meeting and strategic planning session on *P. ramorum* entitled "Perspective on the Sudden Oak Death Syndrome: Risks to Oregon Agriculture and Forestry," at OSU in Corvallis.
- The first report of *P. ramorum* on *Camellia japonica* and *Viburnum tinus* in the US is confirmed at a nursery in Marin County, CA. The symptomatic material was kept adjacent to a stand of *P. ramorum*-infected California bay laurel trees.
- The UK has 264 *P. ramorum* outbreaks recorded on *rhododendron*, *viburnum*, *Camellia japonica*, *Kalmia latifolia*, *Pieris japonica*, *Pieris Formosa* var. *forestii*, *Arbutus*, and *Syringa*. Some of the findings have been in large gardens open to the public and associated with plant nurseries or garden centers. An intensive survey is ongoing.

3/03

- *P. ramorum* is isolated from a potted *Pieris japonica* growing outside under an infested California bay laurel. This is the first find of infested *Pieris japonica* in the US.

1/03

- *P. ramorum* is isolated from *Camellia* in a UK nursery.
- *P. ramorum* is isolated from grand fir, *Abies grandis*, Christmas trees at a Santa Clara County, CA Christmas tree plantation.

12/02

- *P. ramorum* is isolated from over 150 nurseries in the UK. France, Belgium, the Netherlands, Sweden, Germany, and other European countries also report widespread nursery infestations.
- The first Sudden Oak Death Science Symposium is held in Monterey, CA. Over 300 people attend. Eight new plants associated with *P. ramorum* are announced: California Hazel, poison oak, salmonberry, cascara, Victorian box, and *Pieris* (the last from nursery stock in UK).
- Everett Hansen (OSU), along with Rizzo (UCD) and Garbelotto (UCB), name another new *Phytophthora* found on dying oaks and infecting leaves of California bay laurel. *Phytophthora nemorosa* has a similar geographic range as *P. ramorum* but is considered less virulent.

- The *P. ramorum* isolates from Europe are determined to be a different mating type from those isolated in North America, indicating that the pathogen did not come from Europe to CA or vice-versa.

11/02

- Scientists at the US DOE Joint Genome Institute in Walnut Creek and the Virginia Bioinformatics Institute in Blacksburg are receiving \$3.8 million from federal agencies to decode and study the genomes of *P. ramorum* and *Phytophthora sojae*.
- The EU issues regulations for *P. ramorum* to prevent pathogen spread within the Union as well as the importation of the North American genotype and A2 mating type.

10/02

- The CFIA adds a certification program to their *P. ramorum* regulations allowing shipments of field-grown plants into Canada from non-infested counties of CA following inspection.
- *P. ramorum* is found on two shipments of rhododendron in Spain.

9/02

- Australia introduces regulations preventing the importation of host species from countries known to have *P. ramorum*.
- CDFA and USDA APHIS add only the affected plant parts of coast redwood and Douglas-fir to state and federal regulations.
- Governor Davis's administration supports Sudden Oak Death research and response with a \$2 million commitment in the 2002/03 CA budget.
- UC researchers confirm coast redwood and Douglas-fir are susceptible to *P. ramorum* by isolating the pathogen from needles and branches.

7/02

- Forest trees in Humboldt and Contra Costa Counties, CA, are confirmed to have *P. ramorum*, bringing the number of infested CA counties to 12.

5/02

- Two informational meetings are held for resource professionals in Humboldt County, CA. The meetings are hosted by UCCE. About 175 people attend.
- The UK bans imports of plants and wood from infested counties in CA and OR to prevent the spread of *P. ramorum*.

4/02

- Poland's *P. ramorum* findings on nursery rhododendron plants are reported to the US.
- England confirms *P. ramorum* findings on *Viburnum tinus* in a nursery setting.
- The scope of infestation includes 15 known host species, 10 confirmed CA counties, and the following eight state parks in CA: Austin Creek State Recreation Area, China Camp State Park, Jack London State Park, Pfeiffer Big Sur State Park, Samuel P. Taylor State Park, Sugarloaf Ridge State Park, Henry Cowell Redwoods State Park, and Mt. Tamalpais State Park.

3/02

- The media reports that *P. ramorum* DNA has been detected on maple in Foresthill, Placer County, CA (furthest inland report of *P. ramorum*). Unless samples are cultured, Placer County will not be classified as a regulated county.
- Publication of the scientific data that links *P. ramorum* to Sudden Oak Death in Plant Disease 86: 205-214. 2002. *Phytophthora ramorum* as the cause of extensive mortality of *Quercus* spp. and *Lithocarpus densiflora* in California. D.M. Rizzo, M. Garbelotto, J.M. Davidson, G.W. Slaughter, and S.T. Koike.

2/02

- Assemblypersons Nation and Migden introduce AB2251 to continue CA's Sudden Oak Death program.
- The first of two public hearings is held in Petaluma, CA on the interim APHIS Sudden Oak Death regulations. The second hearing was held shortly after in Riverdale, MD.
- USDA APHIS releases interim federal regulations that will oversee interstate movement of *P. ramorum* host material from the CA counties known to be infested.

1/02

- The media reports that *P. ramorum* has been detected on coast redwood. Unless isolates are cultured from samples, coast redwood will not be classified as a host.

12/01

- Senator Boxer announces \$400,000 in agricultural appropriations for Sudden Oak Death research.

11/01

- Marin County Supervisor Cynthia Murray convenes the second Sudden Oak Death Summit.
- *P. ramorum* is confirmed on the UC Berkeley campus.

10/01

- China Camp Back Ranch Campground closes to remove and destroy about 80 hazardous trees. Park trails have another 70 potentially hazardous trees to remove.
- Alameda and Solano Counties are added to the Zone of Infestation by the CA Board of Forestry after confirmation from CDFA that both counties have Sudden Oak Death and are now regulated counties.
- California coffeeberry, Toyon, and California honeysuckle are confirmed as new hosts.

9/01

- The COMTF issues sampling guidelines for *P. ramorum*. CDFA defines and requires "official" samples for regulatory purposes.
- The Legislature passes, and Governor Davis signs, AB 62 (Migden) authorizing funding and spending based on COMTF recommendations. Funds are allocated as follows: monitoring \$440,000; management \$1,796,000 – earmarked largely for affected counties; research \$480,000; education \$221,000; regulation \$420,000; and administration \$243,000.

8/01

- South Korea imposes a *P. ramorum* quarantine on infested counties in CA and OR, prohibiting the importation of known host species.

7/01

- Governor Davis and the Legislature provide \$3.586 million to address Sudden Oak Death in the 2001/02 budget.
- OR identifies and confirms *P. ramorum* on 40 acres in Curry County. Infested areas are quarantined and under regulation. Plans for eradication of host material begins.

6/01

- Senator Boxer introduces a bill in the US Senate calling for \$70 million to address Sudden Oak Death. Congresswoman Woolsey introduces a similar bill in the House of Representatives.

5/01

- CDFA issues emergency regulations, requiring permits to be issued by an authorized agricultural official before moving *P. ramorum* host plants or material within or from infested areas.
- Researcher Matteo Garbelotto, UC Berkeley, develops a molecular diagnostic tool using PCR to identify the presence of *P. ramorum*.
- *P. ramorum* is recovered from madrone and bay laurel.

4/01

- The Board of Forestry and Fire Protection passes a resolution declaring a "Zone of Infestation" for the counties of Marin, Monterey, Napa, San Mateo, Santa Clara, Santa Cruz, and Sonoma. In July 2001, the zone is expanded to include Mendocino County after confirmation by CDFA.
- The new *Phytophthora* is formally named *Phytophthora ramorum* in Mycological Research 105(10): 1155-1165. 2001. *Phytophthora ramorum* sp. nov: a new pathogen on *Rhododendron* and *Viburnum*. Werres S., R. Marwitz, W.A. Man in 't Veld, A.W. De Cock, P.J.M. Bonants, M. De Weerd, K. Themann, E. Ilieva, and R.P. Baayen.

3/01

- Canada issues a quarantine against CA for the new *Phytophthora*.
- OR's emergency quarantine becomes permanent.

2/01

- Researchers recover the new *Phytophthora* from rainwater collected beneath coast live oak stem infections and from soil collected around diseased coast live oak.
- Huckleberry and Shreve's oak are confirmed as hosts of the new *Phytophthora*.

1/01

- The new *Phytophthora* associated with dying oaks is recovered from rhododendron container plants in a Santa Cruz, CA nursery.
- OR bans the new *Phytophthora*'s host plants and other plant products coming from CA unless they have been treated. This emergency rule applies for 90 days.
- The Federal government appropriates \$3.5 million for Sudden Oak Death research and monitoring.

12/00

- State legislators introduce bills to establish a statewide program for Sudden Oak Death: SB31 (Chesbro); AB53 (Wiggins); AB62 (Migden); and ACR (Nation).

11/00

- Clive Brasier of the UK Forestry Commission recognizes that an unknown *Phytophthora* from rhododendron in Germany and the Netherlands, that had been originally isolated in 1993/94, appears identical to the new *Phytophthora* isolated from dying oak trees in CA.
- Marin County Supervisor Cynthia Murray convenes the first Sudden Oak Death Summit. The USDA Undersecretary of Agriculture Jim Lyons pledges \$2.1 million in federal funding for support. Governor Davis pledges \$100,000 in state funding through CDF.

10/00

- The first COMTF general member meeting is held at the USDA FS, Pacific Southwest Region Headquarters in Vallejo. The theme for the meeting is "What is Sudden Oak Death?" About 150 people, including press, attend.

8/00

- The COMTF is formed. It is a voluntary consensus group that brings together public agencies, nonprofit organizations, and private interests to address oak mortality in CA in a comprehensive and coordinated manner.

7/00

- UC researchers identify the cause of Sudden Oak Death to be a previously unknown *Phytophthora* species.

1999

- Researchers join efforts in analyzing increased oak and tanoak mortality levels. The UC system provides \$70,000 in emergency funding and the USDA FS provides \$85,000.

1995

- Large numbers of tanoaks are observed to be dying in CA's Marin and Santa Cruz Counties.