



CALIFORNIA OAK MORTALITY TASK FORCE

SUDDEN OAK DEATH

AND

PHYTOPHTHORA RAMORUM

2004 SUMMARY REPORT

A Compendium of COMTF Monthly Newsletters

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2004 SIGNIFICANT EVENTS

- In March 2004, the California Department of Food and Agriculture (CDFA) announced the detection of *Phytophthora ramorum* on several varieties of camellia plants at a wholesale horticultural nursery in Los Angeles County and a nursery in San Diego County while conducting California's portion of the National *P. ramorum* Survey. In response, shipments were tracked to 40 states, with the pathogen detected in more than 20 states. Over one million nursery plants had to be destroyed as a result of the detections.
- The USDA Animal and Plant Health Inspection Service (APHIS) issued an amended Emergency Order restricting the movement of nursery stock from California nurseries on 4/22/04. The amended order replaced the 4/9/04 Emergency Order and called for nurseries that ship *P. ramorum* hosts or associated plants interstate to be inspected by a regulatory official, sampled, and tested for the disease. Until testing was complete, certifying a nursery as pathogen-free, all out-of-state shipments of host nursery stock and associated articles, as well as plants within the same genus as any host or associated article, and any plant located within 10 meters of a host or associated article, had to remain on hold.
- In 2004, the number of plants found to be *P. ramorum*-susceptible increased by 29 species, for a total of 68 species in over 40 genera. Additionally, Lake County and San Francisco County were found to have *P. ramorum* in natural settings, increasing the number of quarantined California counties to 14.
- USDA APHIS issued an Emergency Order for nurseries 12/21/04 that takes effect 1/10/05, superseding the 4/22/04 Emergency Order that restricted the interstate movement of *P. ramorum* host and associated plants from California. The new order regulates the interstate movement of plants from all nurseries in California, Oregon, and Washington to help prevent the spread of *P. ramorum* to uninfested areas of the United States.
- Funding to address *P. ramorum* totaled over \$28 million in 2004. USDA APHIS provided \$4.5 million for quarantine programs, supplemented with \$15.5 million in emergency quarantine activities, with nearly \$7 million going to CA regulatory programs. The USDA Forest Service (FS), State and Private Forestry provided over \$2.5 million for pathogen monitoring, education, and management. Research funding included \$1.4 million from the USDA Agricultural Research Service (ARS), and the USDA FS, Pacific Southwest Research Station awarded in excess of \$2 million for research efforts. The Gordon and Betty Moore Foundation also granted over \$2.4 million for research.
- In November, Congress passed the Omnibus Budget Bill, allocating \$9.89 million in federal *P. ramorum* appropriations for the 2005 fiscal year. The Agricultural Appropriations Bill earmarked \$1.45 million for USDA ARS; \$94,000 for the Cooperative State Research, Education, and Extension Service; and \$3 million to USDA 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.

BACKGROUND

Sudden Oak Death is a forest disease caused by the plant pathogen *Phytophthora ramorum*. Since 1995, it has killed tens of thousands of native tanoak, coast live oak, and other tree species in California, as well as southwest Oregon. Currently Sudden Oak Death is found in the wildlands of 14 coastal California counties, from Monterey to Humboldt, in addition to Curry County, Oregon.

Tree losses continue to occur in both wildland and urban/wildland interface areas, with up to 80 percent of trees affected in some stands. This unprecedented loss of oaks in California is causing dramatic landscape changes that affect ecosystem function, increase fire and safety hazards, and reduce land values.

P. ramorum not only causes deadly cankers on bole hosts, but it also manifests itself as a foliar or twig blight on more than 40 known plant genera, including CA bay laurel, Douglas-fir, coast redwood, and numerous ornamental species, such as rhododendron and camellia. Unlike bark cankers, the foliar and twig blight rarely causes the host plant to die. Instead, these hosts allow for large amounts of inoculum to build up, thereby facilitating pathogen spread.

Foliar host infection has not only been identified in wildland settings among infected oaks, but it has also been found in European, United States, and Canadian nurseries. In Europe, more than 400 nurseries, in at least 13 countries, have been found to have the pathogen, whereas in the United States 171 nurseries in 20 states have had positive *P. ramorum* detections. In Canada, more than 20 nursery detections have been confirmed.

With many of the hosts being popular ornamental plants that are shipped nationally and internationally, there is concern over areas at high-risk of disease establishment becoming exposed to the pathogen. In response to these challenges, state and federal agencies have implemented *P. ramorum* quarantine regulations to help limit the pathogen's artificial movement. States with regulations in place control the intrastate movement of *P. ramorum* host and associated host material, while USDA APHIS oversees interstate and international movement under federal regulation.

Federal, state, and local agencies; non-profit organizations; and private parties formed the California Oak Mortality Task Force (COMTF) to coordinate a comprehensive and unified program of research, management, monitoring, education, and public policy for California.

This report collates and condenses the COMTF monthly newsletters. The information is presented for various subject areas in chronological order. To understand the current situation, the entire section, or at least the most recent postings, should be read. More information on most topics is available at www.suddenoakdeath.org under archived newsletters. The date the item originally appeared is noted after each entry.

MONITORING

Nine trees at three sites in Cornwall, England were found to be infected with

P. ramorum. Affected trees included four holm-oaks (*Quercus ilex*), a turkey oak (*Quercus cerris*), two beech trees (*Fagus sylvatica*), one sweet chestnut (*Castanea sativa*), and a horse chestnut (*Aesculus hippocastanum*). Sweet chestnut and holm-oak symptoms were limited to leaves, while bleeding cankers were found on the bark of beech trees, turkey oak, and horse chestnut. At one of the Cornwall sites, a second new species of *Phytophthora*, which has not yet been identified, is causing disease on rhododendrons and on a nearby beech tree. (2/04)

Lake County is confirmed as the 13th CA county with *P. ramorum* naturally occurring. The confirmation was made on four California bay laurel trees, located near a perennial stream, in a stand primarily composed of tanoak, California bay laurel, Douglas-fir, and poison oak. The finding came as the result of the Sudden Oak Death Aerial Survey conducted by the USDA FS and Cal Poly, San Luis Obispo. The identified infestation was just east of a confirmed *P. ramorum* infestation in Sonoma County. As an infested county, Lake County was added to the quarantine area. (5/04)

Update of *P. ramorum* National Wildland Survey - State and federal personnel will be conducting surveys in 37 states during 2004: AL, AR, CA, CT, DE, FL, GA, IA, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NV, NY, OH, OR, PA, RI, SC, TN, TX, UT, VA, VT, WA, WI, and WV. The highest priority for sampling will be assigned to forests adjacent to nurseries that may have received infected nursery plants from CA. Other nurseries with host plants, as well as randomly selected general forest areas, will also be surveyed. The USDA FS, Forest Health Protection is spending \$1,084,200 for the 2004 surveys, including an emergency supplemental allocation of \$530,000, triggered by the need to follow-up on trace-forward material from infested CA nurseries. (5/04)

The “Report on the Forestry Commission Woodland Surveys 2004 to Assess the Level of Incidence of *P. ramorum* in British Woodlands” is posted to the UK Forestry Commission website. The survey was carried out at 1,217 high-risk sites across England, Scotland, and Wales, as well as at 131 sites in lower-risk areas of England and Scotland. Of the 335 symptomatic plant samples taken, all were negative for *P. ramorum*. (6/04)

A PCR-positive sample for *P. ramorum* from Nassau County, NY was confirmed by USDA APHIS on 6/25. Follow-up surveys are being conducted by a team from the USDA FS and APHIS, as well as the New York Department of Agriculture and Markets. The lone nested polymerase chain reaction- (PCR) positive mature red oak tree is located in a 192 acre hardwood and oak forest county park. Further surveys are underway to identify other possible infected plants and infested sites. Laboratory work continues in an effort to obtain a *P. ramorum* culture from the tree, soil, or water in the area. The current *P. ramorum* regulations require regulatory action to be taken based on nested PCR results only. (7/04)

In continued response to the PCR-positive red oak in Nassau County, NY, an APHIS Plant Protection and Quarantine (PPQ) Center for Plant Health Science and Technology (CPHST) team collected 61 bark samples from 2 lesions on the tree in Tiffany Creek Preserve. Results are pending, as this investigation follows a multi-agency effort to delimit the area; samples have

been sent to multiple labs to compare results. To date, no *P. ramorum* isolates have been recovered from the tree or the surrounding soil. (8/04)

CDFA announced the confirmation of two *P. ramorum*-infected coast live oak trees in Golden Gate Park, making San Francisco County the 14th quarantined CA county. The detections were made during a survey conducted by the California Department of Forestry and Fire Protection (CDF) as part of a national effort to determine where the pathogen is throughout the US. As a quarantined county, San Francisco will be required to follow State and federal regulations for *P. ramorum*. (9/04)

Extensive follow-up surveying of the PCR-positive *P. ramorum* sample taken from a red oak tree at Tiffany Creek Preserve in Nassau County, NY, has been conducted by the USDA FS, USDA APHIS, the NY Department of Agriculture and Marketing, and the NY Department of Environmental Conservation. To date, foliar symptoms have not been found on any of the host plants at the Preserve. Hundreds of official samples have been taken of the tree and surrounding hosts since the initial sample; all results have been negative. Soil and nearby available standing water have also been sampled and baited with negative results. The Preserve remains under an APHIS Emergency Action Notice while APHIS and NY continue to discuss an appropriate response. (9/04)

Seven new *P. ramorum* infested areas were detected in Humboldt County a few miles from the Redway suppression area. The infested areas are north and northwest of the Garberville Airport, between Redway and Briceland. Eleven positive samples from tanoak, huckleberry, and California bay laurel were detected by the USDA FS and California Polytechnic State University – San Luis Obispo Aerial Survey. Suppression projects are planned for these new finds. *P. ramorum* was also recovered from the South Fork of the Eel River, approximately 8 km downstream from areas under suppression in the town of Redway, Humboldt County. (11/04)

Watershed Monitoring - The Rizzo laboratory (UC Davis), along with the University of California Cooperative Extension (UCCE) Humboldt/Del Norte, established a network of thirty-five sampling locations in February 2004 to monitor for the presence of *P. ramorum* in rivers, streams, and creeks throughout coastal northern CA watersheds. The primary areas of focus included Alameda, Contra Costa, Del Norte, Humboldt, and Mendocino Counties. These are areas where detection of *P. ramorum* has been limited, but ecological parameters and risk models predict them to be high-risk areas. Two sites in Sonoma County were also included to provide a baseline for successful recovery of the pathogen.

P. ramorum was successfully recovered at all sites previously identified as infested through forest surveys. The pathogen was recovered at three additional sites downstream of known forest infestations, but no plants were infected immediately adjacent to the stream site. The first of these sites is along Copeland Creek on the California State University (CSU) Sonoma campus, approximately 7 km downstream from heavily infested Fairfield Osborn Preserve. Another of these sites is along the South Fork of the Eel River, approximately 8 km downstream of known infestation in the town of Redway, Humboldt County. The third site was approximately 3 km downstream from known infestation along Indian Creek in Mendocino County. Additionally,

P. ramorum was recovered at three sites without prior known forest infestation. Two sites, along Bear Creek and Abrigo Creek in Briones Regional Park, Contra Costa County, have had *P. ramorum* recovery from trees at other locations approximately 2 km away within the park, but not adjacent to, or upstream from, these sites. *P. ramorum* has since been recovered in 2004 from California bay laurel trees adjacent to Bear Creek only. Another site in Redwood Creek, approximately 1 km west of the town of Redway, has had successful pathogen recovery without known adjacent or upstream forest infestation.

Stream monitoring provides a method of early detection for *P. ramorum* infestation. Future work will include the addition of monitoring sites in Monterey and San Luis Obispo Counties at the southern extent of the known *P. ramorum* range. In addition, research questions related to spread and survival of this pathogen in watercourses will be addressed. (11/04)

To date, the USDA FS *P. ramorum* National Wildland Survey has sampled 681 nursery perimeter locations in 34 states. Of the 3,207 samples submitted, all were negative for *P. ramorum*. Additionally, 266 general forest locations in 19 states have also been surveyed, with 1,310 samples submitted. Of those submitted, two (from one location) tested positive for *P. ramorum*. The positive confirmations were CA's Golden Gate Park finds in San Francisco County. This survey is being done in close cooperation with the USDA APHIS *P. ramorum* National Nursery Survey. (2004 summary)

NURSERIES

Preliminary results indicate *P. ramorum* was not detected in an OH state nursery survey.

In the summer of 2003, 15 ornamental nurseries in 11 OH counties were surveyed for *P. ramorum*, with 235 samples collected from foliar lesions and twig dieback on rhododendron and azalea plants. In the laboratory, specimens were placed on *Phytophthora* semi-selective medium (PARP) and subcultured to purity on PARP and then V8 juice agar. ELISA tests for detection of *Phytophthora* spp. were conducted on both the plant tissues and the resulting pure cultures. Approximately 50 *Phytophthoras* were cultured out of 235 attempts. For species identification following this preliminary identification to genus, extracted DNA was amplified at the ITS region of the rDNA operon. The ITS region of all cultures was sequenced, and blasted against NCBI databases using BLASTN. All cultures were confirmed as *Phytophthoras*; the following species were identified: *cactorum*, *citricola*, *citrophthora*, *inflata*, *insolita* (ID still tentative), and *nicotianae*. No *P. ramorum* was detected among the isolates. A second round of sequencing will be conducted to confirm these preliminary results. The survey was funded by USDA APHIS. (1/04)

Reappearance of *P. ramorum* at a nursery in WA state. In 11/03, *P. ramorum* was isolated from rhododendrons and camellias on hold at a nursery in Des Moines, WA. One recently detected infected rhododendron lot had previously tested positive via PCR, but had defied isolation for five months. Last spring, both the European (A1) and North American (A2) strains of *P. ramorum* were isolated from the nursery. A second nursery in WA state (retail only) was also found to contain infected *Camellia japonica* v. Kumasaka. (2/04)

P. ramorum* was detected in three nurseries within CA's quarantined area. In San Mateo County, on 2/17/04, *P. ramorum* was detected on five, 5-gallon containerized *Camellia japonica

“Shiro Chan” plants at a wholesale nursery. On 2/23/04, *P. ramorum* was detected on several varieties of *Camellia japonica* and *Kalmia latifolia* plants at a nursery in Sonoma County. At both nurseries, the infected plants were detected as part of routine inspections required for all nurseries that move *P. ramorum* host plants out of the quarantined area. The movement of all *P. ramorum* host and associated host plants from the nurseries to areas outside of the quarantined area has been suspended. Trace-back information regarding shipments of host and associated host plants over the previous year is being collected and affected regulatory officials will be notified.

In 1/04, *P. ramorum* was detected on *Camellia sasanqua* and *Camellia japonica* plants at a Marin County nursery. *P. ramorum*-infected plants had also been detected at the same nursery in spring 2003. Shipments of host plants and associated host plants from the nursery are restricted to within the quarantined area. (3/04)

***P. ramorum* was detected in a third WA state nursery. In 1/04, the Washington State Department of Agriculture (WSDA) detected *P. ramorum* on Rhododendron v. Unique in a Southwestern WA nursery near Long Beach, Pacific County. The nursery was surveyed as part of a trace-back investigation associated with the fall 2003 detections at WA’s first positive nursery (in King Co.). The infected material in the Pacific County nursery was grown on-site. The nursery has been delimited and eradication is in progress.**

Fifteen variety blocks of *Camellia* have been confirmed infected with *P. ramorum* in a WA retail nursery in Gig Harbor, Pierce County. The pathogen was first detected at the nursery in 12/03, as part of the *P. ramorum* National Nursery Survey funded by USDA APHIS. Two of the recently identified infected variety blocks were received in October and November 2003 from CA nurseries outside of the *P. ramorum* quarantine area. These new finds were not detected until early 2004 and were not located near the other infected blocks. Perimeter surveys of the nursery did not detect *P. ramorum*. (3/04)

On 3/10/04, CDFa announced that *P. ramorum* was found at Monrovia Nursery, a large Los Angeles County wholesale horticultural nursery. The pathogen was detected on several varieties of camellia plants as part of the National *P. ramorum* Nursery Survey, in addition to a trace-back survey from a WA state nursery found to have the disease. All host plants at the nursery have been placed on hold, and infected plants will be destroyed. Additionally, all host plants within 10 m of the infected lots will be on hold for 90 days and inspected twice for symptoms of the disease before being released. Host plants beyond the 10 m will go through an additional inspection before shipment. CDFa, USDA APHIS, and many state agriculture departments are currently conducting trace-back and trace-forward surveys for all host material shipped over the past year in an effort to identify any potentially infected material that may have been shipped unknowingly. Agricultural officials internationally are being notified about shipments from the nursery that were potentially carrying the pathogen. (4/04)

CDFa confirmed the presence of *P. ramorum* at Specialty Plants nursery in San Diego County on 3/11/04. Upon confirmation, 7,046 camellia plants were placed on hold. (4/04)

Under the National *P. ramorum* Nursery Survey, nurseries considered to be at high-risk for *P. ramorum* were inspected in Southern CA. Of the 60 surveyed nurseries, 14 were found to be suspect for the disease using PCR tests. To determine disease status within each of the nurseries, culturing had to be completed using samples from each of the PCR-positive nurseries. *P. ramorum* was isolated from samples from only two of the suspect nurseries – Specialty Plants and Monrovia Nursery. (4/04)

The Oregon Department of Agriculture (ODA) has completed laboratory analyses of samples taken from 33 of the 42 OR nurseries being surveyed for *P. ramorum* because of shipments received from Monrovia Nursery, CA. While imported plants from 28 of the nurseries have tested negative, five have come back positive for the pathogen. The five nurseries found positive for the disease are located in Multnomah, Washington, Marion, Lane, and Josephine Counties. (4/04)

The Florida Department of Agriculture and Consumer Services has verified the presence of *P. ramorum* in three FL retail nurseries in Tallahassee, Jacksonville, and Green Cove Springs. Out of the more than 100 plant samples taken from FL nurseries that received shipments from Monrovia Nursery, CA, the survey being conducted has found three positive samples. Customers of the infested nurseries who have recently purchased *P. ramorum* host plants are being encouraged to check their purchased plants for disease symptoms. Consumers with symptomatic host plants are asked to contact the Florida Department of Agriculture and Consumer Services toll-free helpline at (888) 397-1517. (4/04)

USDA APHIS has requested additional Commodity Credit Corporation (CCC) monies to expand the National *P. ramorum* Nursery Survey. Surveys nationwide would be determined based on a series of risk factors, such as climate, leaf emergence, host distribution, and possible nursery exposure to infected plants. To date, the survey has only had enough funding to check high-risk nurseries in CA, OR, and WA as well as several East Coast states. (4/04)

***Pyracantha koidzumii* (Formosa firethorn) has been found infected with *P. ramorum*.** The infected nursery stock was detected by the Canadian Food Inspection Agency (CFIA) in a Vancouver area nursery as part of the Monrovia trace-forward inspections. *P. ramorum* symptoms observed on the *Pyracantha* were limited to leafspots. The infected plant has been shipped to the CFIA quarantine lab in Ottawa for further study. As a result of the find, *Pyracantha koidzumii* has been added to the USDA APHIS *P. ramorum* associated host list. Pending CFIA's Koch's postulates results, the new associated host may be moved to the USDA APHIS regulated host list. (5/04)

Fourteen states are still imposing quarantine regulations on CA beyond those ordered by APHIS PPQ. Of the states imposing further regulations, some include more stringent regulations on OR, WA, or British Columbia. FL has recently changed their quarantine to allow non-*P. ramorum* host nursery stock from CA to be imported. Pre-notification and official verification that no *P. ramorum* host or associated host plants are grown at the shipping nursery are required. WV has also revised their quarantine to allow for incoming shipments of nursery stock from certified nurseries. Additionally, pre-notification of all nursery stock must be made and non-host

nursery stock must be certified. NC and OR have implemented regulations that parallel the federal emergency order. (6/04)

WA has been surveying nurseries for *P. ramorum* since May 2003. During this period, over 250 nurseries have been surveyed and more than 36,000 samples processed. As a result, 20 nurseries have been confirmed as *P. ramorum*-positive. Of the samples taken, Monrovia Azusa trace-forward nurseries represented 28 percent of the total survey, yet produced 78 percent of the infected variety blocks. To date, wildland and nursery perimeter surveys have not identified *P. ramorum* outside of nursery boundaries.

Since 5/04, WA has collected and processed more than 5,000 samples. In 2003, a single nursery was determined to have the European strain of the pathogen; however, so far this year, no European isolates have been identified.

Based on the results of extensive surveying and no positive natural setting *P. ramorum* confirmations, WA believes most of the state's nursery infestations are external in origin, as they are a net importer of nursery stock, with approximately 80 percent of *P. ramorum* host material sold in WA grown out-of-state. Similarly, 85 percent of WA's *P. ramorum* confirmed nurseries are retail establishments that do not produce their own stock. These statistics, coupled with survey findings and WA's moderate climate, has state officials concerned about the vulnerability of their retail/wholesale ornamental nursery industry.

Interested in assuring the quality of nursery stock produced in WA, as well as safeguarding the state's environment, natural resources, and economic well being, WA has developed a multi-pronged approach for addressing *P. ramorum*:

- Conduct a production nursery survey prior to shipping season.
- Develop a *P. ramorum* clean-stock certification program for host material produced in WA.
- Conduct a retail/wholesale nursery survey during shipping season to curtail any flow of infected material into WA's nurseries and landscapes.
- Continue to survey WA's landscapes and wildlands for *P. ramorum* infestations.
- Continue to monitor incoming stock for the presence of *P. ramorum*. (6/04)

In July, the CFIA reported three positive nurseries in British Columbia: one wholesale nursery was identified as having the A1 mating type (European), one retail garden/nursery was identified as having the A2 (North American) mating type, and one production nursery was identified as having the A2 (North American) mating type. In an effort to find plants that had been sold from these nurseries, BC conducted a recall. It is estimated that 50% of the plants sold were returned from private residences. Of the 1,400 plants recovered and sampled, 9 *Camellias* were found to be positive. CFIA estimates that an additional 1,500 plants are still unaccounted for in the greater Vancouver area. The production nursery with A2 infested stock has no US sources, but made 30 shipments to 19 facilities in OR, WA, and CA. These shipments are being investigated.

The CFIA also reported survey completion in 57 BC nurseries, of which three results are still pending, three (above) are positive, and the rest are negative. For the remainder of Canada, including Ontario, Quebec, and the Maritimes, surveys are ongoing, and all results to date have been negative. (8/04)

USDA APHIS PPQ confirmed *P. ramorum* at two production areas owned by a large, wholesale shipping nursery in Washington County, OR, as well as at a bark supply company in Columbia County, OR. Delimitation surveys, in addition to trace-back and trace-forward investigations, are underway at the nursery's two production areas. Both sites are currently under emergency action notices (EAN), prohibiting the movement of host and associated host material off-site. The positive finds were detected during the annual inspection required for participation in OR's *P. ramorum*-free program. Further testing of plant materials at the bark supply facility did not detect *P. ramorum*. Per USDA, the EAN on this facility was lifted, allowing normal business activities to resume. However, plant materials at the facility must be sampled and tested every two weeks for the next six months to verify that the facility remains *P. ramorum*-free. (10/04)

The WSDA is testing plants coming into the state before unloading shipments in an effort to prevent new *P. ramorum* introductions on host nursery stock. Inspectors will take symptomatic and asymptomatic plant samples from trucks before they are delivered to WA nurseries. The objective is to determine if *P. ramorum* is present, but symptoms are suppressed by fungicides. (10/04)

The *P. ramorum* nursery crop Science Advisory Panel for CDFR met in September. Chaired by James MacDonald (UC Davis), the meeting was open to the public, and included a number of participants from the nursery industry. After receiving background information on nursery detections, regulatory actions, and *P. ramorum* sampling and diagnostic methods, as well as feedback from audience members during the public session, the Panel addressed nine key questions. (10/04)

Four additional nurseries in OR have been identified with *P. ramorum*-positive plants. Three of the nurseries are quite small and do not routinely ship interstate, while the fourth is a small to medium size nursery that does do some out-of-state shipping. Three of the nurseries are located in the northern part to the Willamette Valley and the fourth is in Southwestern OR. (11/04)

On 10/27/04, UK Minister for Plant Health and Forestry Ben Bradshaw announced industry assistance for those suffering hardships related to actions taken to protect the wider UK environment from *P. ramorum*. Conditions of this one-time payment of \$200,000 include the industry's willingness to provide matching funds, State Aids' approval from the European Commission, and the industry putting forward realistic proposals for developing long-term risk sharing arrangements in relation to quarantine plant diseases. (12/04)

***P. ramorum* was detected in November at six additional OR nurseries while conducting** compliance agreement surveys. The USDA's Confirmed Nursery Protocol has been initiated at each of the nurseries. So far this year, ODA has completed compliance agreement surveys at 772 nurseries and 665 Christmas tree plantations. The total number of nurseries where *P. ramorum* was found as a result of the survey now stands at 13. No infected plants were found at Christmas tree plantations. Additionally, trace-forward investigations from the Forest Grove, OR nursery finds resulted in pathogen identifications in three CT nurseries. (12/04)

WSDA recently inspected more than 100 Christmas tree plantations for *P. ramorum* on a fee-for-service basis. Similarly, in time for the 2004 holiday greens shipping season, the WSDA and the Department of Natural Resources (DNR) completed surveys on 98 Noble fir (*Abies procera*) sites to comply with anticipated requirements of customers and to preserve market access. As part of the *P. ramorum* National Wildland Survey, 93 nursery perimeters and 26 wildland sites were surveyed by WSDA and DNR. *P. ramorum* was not found. To date, no conifers in WA have been found to harbor the pathogen. (12/04)

From March 2004 through 12/31/04, there have been 176 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(1), SC(4), TN(2), TX(11), VA(2), and WA(25). The newly identified MD nursery tested positive after being sampled as part of the Hines Nursery (OR) trace-forward investigation. The two CA nurseries added to CA's totals were found positive earlier this year, but not included in APHIS statistics until now. One was a trace forward from Monrovia and the second was identified during a compliance survey. (1/04)

REGULATIONS

Six host plants are added to the federal (7 CFR 301.92), OR, and CA *P. ramorum* quarantines: *Camellia sasanqua*, *Pieris formosa x japonica*, *Pieris floribunda x japonica*, *Pieris japonica*, *Viburnum plicatum var. tomentosum*, and *Hamamelis virginiana*. Researchers in OR and the UK identified these new *P. ramorum* host species. Witch-hazel (*Hamamelis virginiana*) was found in an established planting in a large public garden in the UK. The other five species were found in an OR nursery. (1/04)

Regulators in Canada added all species in the genera *Hamamelis* and *Fagus* to Canada's *P. ramorum* quarantine. These additions to Canada's regulated species list are in response to finds of *P. ramorum* on witch hazel (*Hamamelis virginiana*) and European beech (*Fagus sylvatica*) in the UK. (2/04)

ODA is proposing changes to OR's *P. ramorum* regulation and will hold public hearings on the matter 3/24 in Brookings and 3/26 in Salem. The amended quarantine for *P. ramorum* would add new host species to the list of regulated commodities. It would also redefine the quarantine area by adding a 0.5 mile buffer zone, extending the quarantine boundary by two square miles. The new regulation would define the required treatment of infected hosts by property owners and provides property owners with the right to request a hearing regarding such treatments. (3/04)

Following the announcement that *P. ramorum*-infected plants were detected at Monrovia Nursery, individual states imposed bans of various degrees on CA's nursery stock. Other states opted to formalize their inspection protocol for *P. ramorum* host plant shipments. (4/04)

San Luis Obispo County officials are conducting a recall, trying to locate camellia plants that were purchased at retail nurseries receiving shipments from Monrovia. Officials are asking the public to notify them so that recently purchased plants can be inspected for disease symptoms. (4/04)

A policy for response to new detections of *P. ramorum* in wildlands outside the quarantined area was drafted March 31-April 1 in Medford, OR. Forest pathologists and regulatory officials from WA, OR, CA, Washington DC, and the Southeastern US met to agree to regulatory actions to be implemented by states if *P. ramorum* is detected in a forest or wildland environment outside of the currently quarantine area. (4/04)

USDA APHIS issued an amended emergency order restricting the movement of nursery stock from CA nurseries on April 22, 2004. The amended order replaces the April 9, 2004 Emergency Order and calls for nurseries that ship *P. ramorum* hosts or associated plants interstate to be inspected by a regulatory official, sampled, and tested for the disease. Until testing is complete and the nursery is found to be free from the pathogen, all out-of-state shipments of host nursery stock and associated articles, as well as plants within the same genus as any host or associated article, and any plant located within 10 meters of a host or associated article, must remain on hold.

The April 9, USDA APHIS PPQ Emergency Order required visual inspection of *P. ramorum* hosts and associated plants for disease symptoms prior to shipment out of CA. Still concerned about receiving infected nursery stock, 15 states implemented their own regulations. In response to concerns expressed by these states, APHIS worked with State partners to provide uniform rules to prevent interstate shipment of *P. ramorum*. The resulting April 22, 2004 order will remain in effect until amended or until USDA publishes an interim rule in the Federal Register. (5/04)

The CFIA and the British Columbia Landscape & Nursery Association (BCLNA) are recalling Camellia plants imported from Monrovia Nursery, Azusa, CA in an effort to find and remove *P. ramorum*-infected plants. The recall is in response to confirmation of *P. ramorum* in Monrovia trace-forward plants at seven retail garden centers (12 positive samples) in the Fraser Valley and Vancouver Island areas. CFIA has implemented regulations prohibiting the importation of plants from Monrovia Nursery. Additionally, all *P. ramorum* host plants from CA are suspended from entry into Canada and all *P. ramorum* host plants already in Canada from CA are on hold pending approval by CFIA. Inspectors are sampling all BC retailers and nurseries that received plant material from Monrovia Nursery. Approximately 3,400 camellias were shipped from Monrovia, Azusa to BC. (5/04)

The Republic of Korea has modified their “Tentative phytosanitary measures to prevent the introduction of Sudden Oak Death Disease” to add Denmark, Norway, Ireland, and Slovenia to the list of prohibited areas as well as four prohibited plant species: *Rosa gymnocarpa*, *Fagus sylvatica* (beech), *Castanea sativa* (Sweet chestnut), and *Aesculus hippocastanum* (Horse chestnut). The revisions also add 12 regulated species (equivalent to associated hosts in the USDA rule). The revised rule took effect 4/20/04. (5/04)

On 4/30/04, USDA APHIS amended the Federal Confirmed Nursery Protocol of 4/7/04 pertaining to the holding and stopping sale of nurseries that only ship intrastate. Under the new amendment, nurseries found to be positive, that only ship intrastate, are only required to place on hold host nursery stock and associated articles until delimitation within and outside of the nursery are complete. Nurseries with *P. ramorum*-positive plants that ship interstate must hold

all genera of all host plants and associated plants until delimitation within and outside of the nursery are complete. (6/04)

CDFA revised required actions at *P. ramorum*-positive retail nurseries and garden centers in May. CDFA adopted the 4/30/04 USDA APHIS changes described above, but added new rules that apply only to retail nurseries or garden centers in uninfested counties. Under the new guidelines, *P. ramorum*-positive retail nurseries and garden centers in uninfested counties will not be required to hold plants of the same genera as *P. ramorum* hosts and associated hosts. The new requirements call for all host species and associated host species to be inspected and sampled for *P. ramorum*, and for symptomatic host and associated host plants to be placed under a nursery stock non-compliance hold. For all host and associated host plants that test positive, the lot will be destroyed. (6/04)

The USDA APHIS April 22, 2004 Emergency Rule included significant changes in the regulatory diagnostic protocols for *P. ramorum*. The enzyme-linked immunosorbent assay (ELISA) test is to be used as a pre-screen for *P. ramorum* samples. Phytophthora ELISA tests indicate whether any Phytophthora species is present; they are simple, quick, and inexpensive to perform. While ELISA negative samples need no further analysis, positive samples must be tested further by culturing or nested PCR. Samples that are culture-negative (meaning no *P. ramorum* is isolated) must be tested via nested PCR. Nested PCR is required for negative culture samples because the failure to isolate *P. ramorum* from symptomatic tissue does not mean that the organism is absent. Many factors may inhibit pathogen growth in culture, including fungicides, sampling at a time of year when environmental conditions or pathogen physiology are not conducive to isolation, and/or poor lab techniques. For these reasons, a sample will be declared positive based on nested PCR even though the organism may not have been isolated in culture. (Should this occur, however, it is strongly encouraged that further attempts be made to isolate the organism.) (6/04)

ODA adopted a temporary rule in June calling for all OR growers and dealers of plants susceptible to *P. ramorum* to be annually inspected, tested, and certified free from the pathogen before host plants are allowed to be sold. The new regulation comes at the request of OR's nursery industry and is in response to the discovery of *P. ramorum* on plants in a Columbia County nursery that were identified in April 2004 as part of a trace-back survey from MD.

The presence of *P. ramorum* at the Columbia County nursery was confirmed on May 18, 2004, following surveying, sampling, culturing, and nested PCR confirmation. Anna Kruschke and Catawbiense Grandiflorum *Rhododendron* cultivars were confirmed positive. Following the confirmation, OR officials performed delimitation surveys within (4,240 samples tested) and outside of the Columbia County nursery (720 samples tested). Within the nursery, *P. ramorum* was recovered from a composite potting media sample taken from several plants in one hoop house. Of the samples taken outside of the nursery, *P. ramorum* was confirmed on three *Rhododendron* 'Anna Kruschke' that had been planted four weeks prior to the delimitation survey at the entrance of a neighboring business. The plants had been donated to the business from the nursery.

In addition to the statewide temporary rule, ODA also adopted an emergency 90-day quarantine in June for all nurseries and compost production facilities in Columbia County. The quarantine requires nurseries in the county to have all *P. ramorum*-susceptible plants tested and found free from the pathogen before they are available for sale. This requirement applies to in-state and out-of-state shipments. The quarantine also prohibits sale or shipment of potting media and compost produced in the county that contains material from susceptible plants, unless the production facility is inspected and found free of *P. ramorum*. Additionally, the composted material must not have originated from areas already generally infested with the pathogen. Finally, commercially produced compost containing susceptible plant material cannot be sold to nurseries unless it is sterilized by a method approved by ODA. (7/04)

APHIS amended the regulation of *Camellia* on 6/23 to include all species, hybrids, and cultivars. The amendment came as the result of 7 new species (10 total) and 18 new hybrids (19 total) of *Camellia* found to be infected with *P. ramorum*. (7/04)

APHIS added *Clintonia andrewsiana* (Andrew's clintonia bead lily), *Dryopteris arguta* (California wood fern), *Smilacina racemosa* (false Solomon's seal), and *Taxus brevifolia* (Pacific yew) to the *P. ramorum* associated host list in June, as the pathogen has been isolated from each plant type in native CA settings. (7/04)

A two-day review of the USDA APHIS PPQ *P. ramorum* program was held at the USDA Headquarters office in Riverdale, Maryland in July. The review objective was to provide a national overview and analysis of program activities, specifically those since March 8, 2004, when Monrovia Nursery in Los Angeles County was identified as having *P. ramorum*-infected plants. Invitees included USDA Forest Service, APHIS, and ARS staff and scientists; state cooperators; and representatives from the nursery industry. (8/04)

MS updated its emergency *P. ramorum* regulations on 7/9/04. The newly expanded regulation prohibits the importation of CA, WA, and OR *P. ramorum* host and associated plants at the genus level. (8/04)

The California Association of Nurserymen (CAN) filed a federal suit against KY on 7/12, 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. CAN's hope for the lawsuit is that all states will have to comply with the federal *P. ramorum* regulation, instead of being allowed to adopt their own state-specific restrictions. (8/04)

The states of AL, DE, FL, KY, MS, and WV requested a Special Needs Exemption from the current *P. ramorum* federal regulations. USDA APHIS denied the requests. (8/04)

Mexico is considering quarantining (NOM-013-SEMARNAT-2004) Douglas-fir (*Pseudotsuga*) and fir (*Abies*) Christmas trees from areas with *P. ramorum* to prevent introduction of the pathogen into Mexico. (8/04)

A *P. ramorum* forest greenery products meeting was held on 7/22/04 at Washington State University, Puyallup. Representatives of the WA and OR forest greenery industry, WSDA, and APHIS, as well as members of the WA state legislature, met to discuss ways the forest greenery industry can deal with possible *P. ramorum*-related restrictions on the movement of boughs and other greenery products. (8/04)

On August 5, 2004, USDA APHIS added four new species to the list of *P. ramorum* associated host plants, and de-listed one species. *Calluna vulgaris* – Scotch Heather (Ericaceae), *Drimys winteri* - Winter's-bark (Winteraceae), *Laurus nobilis* – Sweet bay laurel (Lauraceae), and *Salix caprea* – Kilmarnock willow (Salicaceae) were found infected with the pathogen in Europe, and are now listed as regulated articles. *Vaccinium vitis-idaea* (lingonberry) was removed from the *P. ramorum* associated host plant list because the Plant Protection and Seed Service of Poland was unable to validate their original association of lingonberry with *P. ramorum*. (9/04)

ODA lifted its quarantine of Columbia County, OR nurseries and compost production facilities in August after determining that the pathogen had not spread beyond the initial confirmation location. Following an extensive survey, the state determined the infestation was limited to two blocks of plants in the infested nursery, and that infected plants in the neighboring landscape originated from those infested blocks. (9/04)

On August 12, 2004, the National Plant Quarantine Service, Ministry of Agriculture and Forestry, Republic of Korea (NPQS), modified its “Tentative phytosanitary measures to prevent the introduction of Sudden Oak Death Disease.” Updates to the regulation included the addition of Nassau County, NY, as well as 22 new plant species. Effective 9/9/04, 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. (10/04)

The ODA Plant Division has posted a list of 119 nurseries and 287 Christmas tree growers that are participating in OR’s *P. ramorum*-free program. To be posted to the list, nurseries and Christmas tree growers must have been inspected, tested, and found *P. ramorum*-free, and must have signed a compliance agreement with the state. The compliance agreement requires the grower to take certain precautions to prevent the introduction of *P. ramorum* to their production areas. To view the current list of qualified participants, go to http://egov.oregon.gov/ODA/PLANT/sod_free.shtml. (10/04)

ODA held a public hearing on 11/19 to discuss a proposed regulation designed to extend OR’s *P. ramorum* certification program for the next three years. The Oregon Association of Nurseries testified at the hearing, supporting the continuation of the certification program as long as the proposed ODA regulation mirrored provisions found in the proposed federal USDA-APHIS Emergency Order. OR officials intend to harmonize the state’s regulation with the federal Emergency Order. (12/04)

USDA APHIS issued an emergency federal order for nurseries 12/21/04 that will take effect on 1/10/05, superseding the 4/22/04 emergency order that restricted the interstate movement of *P. ramorum* host and associated plants from CA. The new order regulates the interstate

movement of plants from all nurseries in CA, OR and WA to help prevent the spread of *P. ramorum* to uninfested areas of the US. (1/05)

With the issuance of the new USDA APHIS emergency *P. ramorum* order, Canada will rescind regulations implemented as a result of the Monrovia event last March. Following the Monrovia confirmations, Canada quarantined all rose plants and cut roses as well as all host plants and plant parts at the genus-level from the state of CA. Canada's updated regulation will only affect CA's 14 quarantined counties and will only address those plants in the US federal order. Additionally, Canada is no longer considering quarantine regulations for WA and OR. 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.

Additionally, in mid-November, USDA APHIS and the CFIA met to develop a North American *P. ramorum* management plan. The outcome of the meeting was an agreed to five-point-plan, which included a framework to use over the next few years. Efforts will include the harmonization of Canadian and United States scenario responses to future finds. (1/05)

USDA APHIS added *Fraxinus excelsior* (European ash) and *Nothofagus oblique* (Roble beech) to the federal *P. ramorum* regulation. The additions are based on detection and confirmation in the UK, where *P. ramorum* was found infecting the boles of these species.

Additionally, False Solomon's seal (*Maianthemum racemosum*, formerly *Smilacina racemosa*), *Calluna vulgaris* (Scotch heather), and *Photinia fraseri* (Red tip photinia) were moved from the APHIS associated host list to the host list in the 12/21/04 federal order due to the completion of Koch's postulates for each species. (1/05)

MANAGEMENT

Santa Cruz County plans to remove 1,465 *P. ramorum* hazard trees at risk of falling along roads and power lines in the Santa Cruz Mountains between Soquel Creek and Bonny Doon. The \$437,000 cost of removing the trees will be funded out of California State Sudden Oak Death Tree Assessment, Removal, and Restoration Plan funds. Logs and woody debris that cannot be left on site will be taken to the new SODBusters collection yard at the Ben Lomond Transfer Station. (2/04)

Ben Bradshaw, Minister for Nature Conservation and Fisheries in the UK, visited Big Sur, CA and Brookings, OR to observe Sudden Oak Death management programs. Bradshaw is Parliamentary Under-Secretary (Commons) and oversees the Department of Environment, Food and Rural Affairs (DEFRA). The UK is formulating policy to respond to the recent detection of *P. ramorum* killing their native trees. Bradshaw was accompanied by Stephen Hunter, Head of Plant Health Division for DEFRA, from York, UK. (2/04)

In an effort to slow the spread of *P. ramorum*, the Humboldt County Department of Agriculture, CDF, and the local UCCE removed and disposed of 77 California bay laurel trees infected with *P. ramorum* in Humboldt County. The project took place in the County's only known area of infection on six different properties. Following the treatment, soil, water, and plants in the area will be monitored to determine if this procedure was effective in limiting

pathogen spread. Three landowners did not participate in the project, leaving several infected California bay laurel trees and a 2-inch redwood sapling yet to be removed. Forestry and agriculture officials continue to seek permission to remove the trees. (3/04)

Prior to the removal of infected California bay laurel trees and seedlings in Redway, Humboldt County, foliar and soil samples were taken to serve as a baseline for pathogen distribution and survival. Fourteen of seventeen foliar samples taken were confirmed with *P. ramorum*, one with *P. nemorosa*, and two were negative. This confirms that symptomatic trees continue to host *P. ramorum* and the survey crew was able to generally recognize the pathogen in the field. Soil samples were taken at the base, dripline, and far from infected trees. Six of thirty soil samples (all from the base or dripline) were positive for *P. ramorum*, suggesting that the pathogen can be found, to a limited extent, in the local area. The project and surrounding area will continue to be monitored for pathogen survival to determine if selective removal of infected plants in an isolated infestation slows pathogen spread. In addition, UCCE in Humboldt and Del Norte Counties prepared a survey protocol in March and secured permits from appropriate agencies to begin surveying for symptoms of *P. ramorum* around trails, parking areas, campgrounds, and other high-visitation areas in Mendocino, Humboldt, and Del Norte County State and national parks. The survey begins in April. (4/04)

Northeastern state foresters met in Windsor Locks, CT on June 30, 2004 to discuss the status of Sudden Oak Death and Emerald Ash Borer and increase the awareness of potential impacts of these diseases on northeastern forests. (7/04)

On 9/21/04, DEFRA, along with the Forestry Commission, announced that the disease eradication program already in place for *P. ramorum* would be extended to cover a new Phytophthora species. While surveying for *P. ramorum*, the new species of Phytophthora was found in Cornwall causing *P. ramorum*-like symptoms on beech trees and rhododendrons. This new species is not known from any other country, and is temporarily known as "*Phytophthora taxon C.*" There is some evidence that it may kill beech trees more rapidly than *P. ramorum* under UK conditions. DEFRA and the Forestry Commission are collaborating with landowners to conduct experiments to see whether woodlands in the affected area can be safeguarded through removal of rhododendrons. (10/04)

ODA received and approved 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. Oregon will allow all uses listed on the approved product label; however, the product label does contain significant restrictions for use in CA. The U.S. Environmental Protection Agency (EPA) will work with registrant to clarify the wording of the CA use restrictions. Note that CA currently has a Special Local Needs registration for Agri-Fos® use on oaks and tanoaks to prevent *P. ramorum*. (12/04)

Two SODBusters collection yards are currently in operation. The Marin County yard at the Marin Resource Recovery Center has been in operation for 20 months, while the Santa Cruz County yard at the Ben Lomond Transfer Station has been in operation for 13 months. Established for the collection and utilization of *P. ramorum*-infested plant material, deliveries are received in the form of logs, rounds, limbs, and wood chips. During non-winter months, the

Marin Center receives about 45 tons of material monthly, while the Santa Cruz Transfer Station receives about 40 tons a month. Approximately 40 percent of the material received has been processed into firewood to study *P. ramorum* viability on wood that has been seasoned under a variety of weather conditions. Material not processed into firewood is sent to biomass facilities for use as fuel. A very small amount of high-value logs have been processed into lumber products. (2004 summary)

RESEARCH

UC Berkeley researchers have confirmed the susceptibility of wood rose (*Rosa gymnocarpa*) to *P. ramorum*, making it the latest plant to join the list of regulated host species. The naturally infected plants, observed in Sonoma County, indicate that wood rose is not killed by the pathogen, but sporangia have been observed on the infected petals, making it a potential vector for the pathogen. California rose (*R. californica*), another common CA wild rose, was lab inoculated with *P. ramorum*. While lesions did develop, symptoms on California rose have not been observed in the forest, making it ineligible for the regulated host list. *R. sempervirens* was also identified as being susceptible in artificial inoculations of detached leaves by E. Morales and L. Hernandez in Spain. Alan Inman, DEFRA, found *Rosa canina* to be susceptible in artificial inoculations. Toyon and salmon berry are other known hosts in the Rosaceae family. Huberli is currently testing susceptibility of commercial hybrid roses. (4/04)

In the April 2004 Mycological Research article, “Investigations in the Genetic Diversity of *Phytophthora ramorum*,” Kelly Ivors, Matteo Garbelotto, and others compare the genetic structure of *P. ramorum* within and between US and European populations. Researchers had previously described differences between the two geographic populations, explaining that European isolates are predominantly the A1 mating type while the North American isolates are mostly the A2 mating type, but beyond this major separation, it was unclear how distinct the populations were.

The researchers performed several typical genetic analyses. First, they isolated specific sections of the genome, amplified them with special primers, and used this information to determine the genetic relationship of numerous *Phytophthora* species. Next, they performed AFLP (amplified fragment length polymorphism) reactions and PCR tests. The results of these analyses were then translated into a distance cladogram, which is visualized as a tree.

Sixty-seven American isolates from 11 CA and 2 OR counties (isolates from nurseries and wildlands) were analyzed, along with 18 European isolates from 5 countries. A single clone genotype accounted for 75% of the North American samples, showing very limited variability in the US population. In contrast, 15 distinct genotypes were observed among 18 European isolates. The higher variation in the European population suggests the introduction of multiple strains, a longer residence time there, or different selection pressures (i.e. differences between nursery and wildland conditions). Surprisingly, there exists a greater deal of variation in morphology, growth rate, and virulence in North American isolates as reported by other scientists, although Ivors' DNA studies did not reveal this. Phenotypes are the physical expression of the underlying genes, so different environmental pressures may have produced these different characteristics from basically the same genotype.

Their analyses show a low level of diversity within each population, since most of the variation was due to a very limited number of differences. When the two populations were compared against each other, there was a larger difference – with each population clustering into its own distinct lineage. The overall similarity of all the isolates confirms that the two populations are genetically related and suggests that *P. ramorum* could be a recently evolved species. They also determined that *P. ramorum* is most closely related to *P. lateralis* and *P. hibernalis*, well known pathogens of Port Orford cedar and citrus trees (respectively).

The predominance of a single mating type and low levels of genetic diversity within each population supports the hypothesis that *P. ramorum* was recently introduced into both North America and Europe from a third, as yet unknown, location. Ivors *et al.* theorize that the separate establishment of *P. ramorum* on the two continents is most likely due to increased movement of plants from the wild into cultivation, and from one part of the world to another through international nursery trade. Results from the isolates analyzed suggest that there probably hasn't been any sexual recombination between the two populations, or between the two mating types. (4/04)

“Disease progression of *Phytophthora ramorum* and *Botryosphaeria dothidea* on Pacific Madrone” - Pacific madrone (*Arbutus menziesii*) appears to be highly susceptible to *P. ramorum*. While we know that *P. ramorum* can cause leaf lesions and stem cankers on these trees, it's often difficult to confirm the presence of this pathogen when culturing. Additionally, there are a number of other common forest pathogens that can cause similar symptoms. Patricia Maloney, David Rizzo, and others examined the susceptibility of madrone to *P. ramorum* as well as to a native forest pathogen, *B. dothidea*, also common on madrone. Their study, “Disease progression of *P. ramorum* and *B. dothidea* on Pacific Madrone,” (soon to be published in Plant Disease) focused on the susceptibility of madrone to *P. ramorum* in a natural forest setting as well as in laboratory experiments; assessing disease development and recovery from host tissue infected by these pathogens; and determining whether there are any interactions between the two pathogens as they compete for similar resources.

Healthy 4-year-old madrone saplings were set out in 2001 and in 2002 at Jack London State Park, where *P. ramorum* could naturally infect them. Within two to five months, nearly all (70-100%) of the madrone saplings had *P. ramorum* infections on both stems and leaves.

B. dothidea was isolated from all of these samples as well. Over half (50-66%) of the madrones in this study ultimately died from *P. ramorum* infection.

Maloney *et al.* also inoculated 1-year-old seedlings in growth chamber experiments to measure lesion development, and to examine competition between the two pathogens. *P. ramorum* caused larger lesions than *B. dothidea*, but lesion size did increase for both pathogens when wound inoculated. In all cases *B. dothidea* symptoms were less severe than those caused by *P. ramorum*, with 75 percent of *P. ramorum*-inoculated seedlings having died, while only 25 percent of *B. dothidea*-inoculated seedlings died.

The two pathogens were found to be able to coexist when placed together on seedlings. However, while *B. dothidea* was recovered from stems and leaves for all treatments, it was less

frequently recovered when *P. ramorum* was also present. Generally, *P. ramorum* more effectively infected stems. On leaves, *P. ramorum* grew best in isolation or if it proceeded *B. dothidea* infection. The recovery rate of *P. ramorum* from stems where *B. dothidea* was established first was lower than the other treatments.

After 49 days of infection, recovery of *P. ramorum* was difficult from both infected stem and leaf tissue. This suggests that madrone field samples should be taken when the infection is recent and active. If this is not possible, and you cannot culture the pathogen from live plant material, PCR methods can often confirm the presence or absence of *P. ramorum* DNA. Unfortunately, larger trees are difficult to diagnose because symptomatic branches are often inaccessible and dieback looks very similar to *B. dothidea* infections.

B. dothidea is considered an opportunistic pathogen that rarely attacks healthy trees, and generally does not kill madrone unless coupled with other stress factors. However, *B. dothidea* coupled with *P. ramorum* may affect growth and reproduction of madrone. Both pathogens readily disperse in the rainy winter months. While *P. ramorum* is most active in wetter months and less active during the dry season, the reverse is true for *B. dothidea*. Together, the two pathogens could create a continuous attack on madrone throughout the year. (5/04)

On 6/10/04, the US Department of Energy (DOE) Joint Genome Institute (JGI) and the Virginia Bioinformatics Institute (VBI) announced the completion of the DNA sequencing of *P. ramorum* and *Phytophthora sojae* (a soybean disease). Having sequenced both *Phytophthoras*, researchers will be able to compare the genome of each, gaining a greater understanding of the uniqueness or similarities between these pathogens. The new information will provide a framework for the identification of cellular processes that can be targeted for diagnostics, in addition to safe and effective applications for use in disease treatment and/or control. Currently, the USDA FS, Pacific Southwest Research Station, is funding research at JGI using the sequence information for the development of a rapid, effective field detection system for *P. ramorum*. The sequencing project for these two *Phytophthoras* received nearly \$4 million in support from the USDA, the National Science Foundation (NSF), and the DOE. (7/04)

Developing Tools for Field Detection of *Phytophthora ramorum*, the causative agent of Sudden Oak Death - Sharon A. Doyle, DOE Joint Genome Institute

The goal of this project is to use genomic information to develop reagents for a rapid and sensitive field test for *P. ramorum*. This test could be used to diagnose infected plants, soil, and water, and to mitigate the spread of *P. ramorum*.

The basis of this rapid test is the production of reagents that will detect specific proteins, called elicitors, secreted by *P. ramorum*. These proteins are abundant at the plant-pathogen interface. Identification of proteins instead of the genes allows for the in-field aspect of the system, since secreted or extra-cellular membrane proteins can be detected directly and do not require extensive laboratory manipulation, such as extraction. In addition, protein detection may distinguish between live or dead *P. ramorum*, which is not possible when DNA detection methods are used.

The reagents that will be generated are called DNA aptamers. Aptamers are short, single-stranded DNA molecules that fold into 3D structures and bind very selectively and specifically to their selected proteins. The use of DNA aptamer reagents instead of traditional immunological methods for protein detection provides key advantages. DNA-based reagents offer optimal stability, affinity and specificity, and are ideal for use in a field tool.

The first step in developing such a test is to search the genome of *P. ramorum* for biomarkers, or genes that encode secreted proteins with unique sequences. Once these sections of the genome are identified and isolated, they are cloned to produce recombinant proteins in the lab. The next step is to generate DNA aptamers that bind the target proteins and signal the presence of *P. ramorum*. The aptamers will first be tested in the laboratory to determine whether they specifically recognize proteins from *P. ramorum*. Then the aptamers will be tested with field samples containing *P. ramorum* from plant material. The final step is to use these reagents to create a diagnostic tool for use in the field. The DNA aptamers generated by this project will be transferred to engineers for development of a rapid field diagnostic kit. It is unsure exactly how such a field kit would be designed, but the benefit of a rapid field diagnostic tool for *P. ramorum* is obvious.

The project is funded by the USDA FS, Pacific Southwest Research Station. (7/04)

The genotype of *P. ramorum* isolates linked to the Monrovia Nursery infestation has been verified as the North American population, A2 mating type. Kelly Ivors, formerly of the Garbelotto lab at UC Berkeley, conducted two different molecular tests to identify and insure accuracy of the information. (8/04)

The JGI hosted a *Phytophthora* Genome Sequence Annotation Jamboree, in August at its Walnut Creek, CA production sequencing facility. The Jamboree brought together 40 *Phytophthora* genomics experts to compare the genomes of *P. ramorum* and *P. sojae* (*P. sojae* causes over \$1 billion annually in soybean damage.). From the meeting, the identification of large numbers of sequence variations and repeats were found in the *P. ramorum* genome, which should enable better DNA fingerprinting for pathogen tracking and more sensitive PCR-based diagnostic tests. (9/04)

Richard S. Dodd, Daniel Huberli, Vlad Douhovnikoff, Tamar Y. Harnik, Zara Afzal-Rafii, and Matteo Garbelotto. Is variation in susceptibility to *Phytophthora ramorum* correlated with population genetic structure in coast live oak (*Quercus agrifolia*)? *New Phytologist* (2004) doi: 10.1111/j.1469-8137.2004.01200.x

California coastal woodlands are suffering severe disease and mortality as a result of infection from *Phytophthora ramorum*. *Quercus agrifolia* is one of the major woodland species at risk. This study investigated within- and among-population variation in host susceptibility to inoculation with *P. ramorum* and compared this with population genetic structure using molecular markers.

Susceptibility was assessed using a branch-cutting inoculation test. Trees were selected from seven natural populations in California. Amplified fragment length polymorphism molecular markers were analyzed for all trees used in the trials.

Lesion sizes varied quantitatively among individuals within populations, with up to an eightfold difference. There was little support for population differences in susceptibility. Molecular structure also showed a strong within-population, and weaker among-population, pattern of variation.

Our data suggest that susceptibility of *Q. agrifolia* to *P. ramorum* is variable and is under the control of several gene loci. This variation exists within populations, so that less susceptible local genotypes may provide the gene pool for regeneration of woodlands where mortality is high. (10/04)

Swiecki, T. J.; Bernhardt, E. 2004. *Phytophthora ramorum* canker: Factors affecting disease progression and failure potential. 2003-2004 Contract Year Annual Report. Prepared for USDA FS, Pacific Southwest Research Station, Berkeley, CA. 35pp.

We have completed four years of observations in a case-control study examining the role of tree and site factors on the development of *Phytophthora ramorum* stem canker (sudden oak death) in coast live oak (*Quercus agrifolia*) and tanoak (*Lithocarpus densiflorus*). In September of each year from 2000 through 2003, we collected data on *P. ramorum* symptoms, tree condition, stem water potential, and various other factors in 150 circular plots (8m radius) in areas where *P. ramorum* canker was prevalent in 2000. Each plot is centered around a case (symptomatic) or control (asymptomatic) subject tree. Plots were established at 10 locations in Marin County, and 1 location each in Sonoma and Napa Counties.

Since September 2000, the percentage of symptomatic coast live oak trees in the plots has increased from 22.9% to 24.4%. Two-thirds of this increase in disease incidence occurred between September 2002 and September 2003, following the first relatively wet spring of the study. Between 2000 and 2003, the incidence of *P. ramorum* canker in tanoak has increased from 33% to 39%. For tanoak, increases in disease incidence were approximately equal in each observation interval, about a 2% increase in disease incidence per year.

Mortality due to *P. ramorum* among all monitored coast live oak increased from 3% to 8% between 2000 and 2003. Over the same period, *P. ramorum*-related mortality in all monitored tanoak has increased from 12% to 22.5% in 2003.

Between September 2000 and September 2003, substantial failures occurred in 32% of coast live oaks with *P. ramorum* symptoms but only 2% of coast live oaks lacking *P. ramorum* symptoms. Over this time interval, 73% of trees that were dead as a result of *P. ramorum* canker in 2000 have failed, and 65% of the trees with late *P. ramorum* symptoms in 2000 (cankers with beetle boring and/or *Hypoxylon thouarsianum*) had failed. In contrast, only 10.5% of the coast live oaks with early *P. ramorum* symptoms (bleeding cankers only) in 2000 had failed by 2003 and less than 1% of healthy asymptomatic trees failed over this period. Bole failures were most common

overall (58% of all failures) and root failures were the least common failure type (1.7% of the failures).

Because *P. ramorum* primarily causes a bark canker in coast live oak, we initiated a study to determine whether observable bark characteristics are related to *P. ramorum* canker occurrence or progress. In 2003, we evaluated both bark thickness at 1m height and a variety of morphological bark characteristics in a subset of study trees. In this sample, we found that *P. ramorum* canker was more likely to occur in trees with greater bark thickness. We also observed that coast live oak bark thickness increases in a nonlinear manner as tree diameter increases, which suggests that relationships between tree diameter and disease could be related to bark thickness. Only one of the bark morphological characteristics we assessed, the presence of unweathered bark in bark furrows, was positively correlated with disease. This characteristic seems to be associated with faster rates of tree radial growth, and is consistent with other analyses indicating that faster-growing coast live oaks have a greater risk of developing *P. ramorum* canker than slow-growing trees.

Based on four successive years of stem water potential (SWP) measurements on the same set of trees, it appears that SWP values measured in September are mainly influenced by rainfall over the three preceding rainy seasons. SWP readings for individual trees in all three years are also highly correlated. SWP readings indicate that water stress is not a significant predisposing factor for the development of *P. ramorum* canker in coast live oak. Most coast live oaks with *P. ramorum* canker symptoms have maintained relatively high SWP levels and do not show progressive increases in water stress as disease develops. We hypothesize that SWP levels in many of these trees with advanced symptoms of disease remain high because of the progressive diffuse canopy dieback that develops in trees with advanced *P. ramorum* canker symptoms. Leaf area loss resulting from branch dieback reduces evapotranspiration while roots continue to function, which allows trees to maintain high SWP levels. (10/04)

The third International Union of Forest Research Organizations, Phytophthora in Forests and Natural Ecosystems meeting was held in Freising, Germany in September. Abstracts of the nine papers and 10 posters presented on *P. ramorum* will be posted to the meeting website: <http://www.phytophthora-freising-2004.de/>. (10/04)

The CSREES Multi-state Project W-501, Management of *P. ramorum* in US Nurseries, had its first meeting in October in Corvallis, OR. There were 31 participants from seven states in attendance. The purpose of the initial 2-year project is to provide a multi-state forum for the exchange of information and coordination of research and extension activities on *P. ramorum* in nurseries. The group prioritized issues and needs for future research and extension, discussed possible collaborative projects, and considered the desirability of continuing as a regular 5-year multi-state research project. The group also drafted a resolution regarding current diagnostic protocols. (11/04)

The 14th Ornamental Workshop on Diseases and Insects was hosted by NC State University (NCSU) in Hendersonville, NC 9/27 – 10/1. Approximately 140 participants from universities, government entities, and private industry across the nation were in attendance. Presentations and discussions included “Sudden Oak Death: How a forest disease has put the nursery industry at

risk” by Mike Benson (NCSU); the “National pilot survey for *P. ramorum*-nurseries” led by Jean Williams-Woodward (University of Georgia); and “Oak diseases that might be confused with SOD” by Ann Gould (Rutgers University) and John Hartman (University of Kentucky). “Ornamental diseases that might be confused with SOD” was led by Sue Spencer (NC Dept Ag & Consumer Services), with “Camellia” covered by Steve Jeffers (Clemson University), “Rhododendron” by Mike Benson, “Pieris” by Melodie Putman (Oregon State University), “Viburnum” by Karen Rane (Purdue University), and “Other hosts” by Colleen Warfield (NCSU). “Selecting the right tissue for analysis” was addressed by Sharon Von Broembsen (Oklahoma State University); Karen Snover-Cliff (Cornell University) presented “The National Plant Diagnostic Network and how it responded to SOD;” and Kelly Ivors (NCSU) presented “ELISA, nested PCR, and isolation of *Phytophthora ramorum*- pitfalls in detection.”

Ivors presented data collected from various labs on *P. ramorum* diagnostic results using the three techniques recommended by APHIS for detection of the pathogen. A comparison of results indicated that nested PCR assays do not always agree with culture isolation results, and that no one current method is more sensitive than the other. However, if *P. ramorum* cultures were obtained, the ELISA assay always yielded a positive reaction. This indicates that utilizing the ELISA assay for pre-screening samples can be an effective way of reducing the number of samples to be processed. (11/04)

The recently identified *Phytophthora* taxon C (UK) has been provisionally named *Phytophthora kernovii*, after Cornwall’s ancient name, by its discoverers Clive Brasier and colleagues at the UK’s Forestry Commission Forest Research Agency. Found causing disease in Cornwall, England in November 2003 on rhododendrons and a nearby beech tree, the pathogen has since been found in Cornwall on 30 beech trees and two English oaks (*Quercus robur*). To date, all finds have been within the *P. ramorum* quarantined area, in woods with a rhododendron-dominant understory. Infected rhododendrons and other plants are being destroyed.

So far, this other new invasive *Phytophthora* seems to be confined to southwest Britain. Initial laboratory tests and observations in the wild indicate that it may be more aggressive or spread faster than *P. ramorum* on rhododendron. Rhododendron, the main host and source of infection, succumbs to disease in just a few weeks rather than months. *Magnolia* and *Liriodendron* have also been affected. This latest discovery raises fears over the pathogen’s potential impact on Britain’s trees and shrubs, as well as the damage it might cause should it spread to forest ecosystems outside the UK. Among several suggested origins for the new fungus is Yunnan, China, because of the pathogen’s apparent association with Magnoliaceae (*Mycological Research* 108, 1108-1110 2004).

The DEFRA Plant Health and Seeds Inspectorate has proposed draft options for containing and eradicating the pathogen within a designated “disease management zone.” The objective would be to eradicate over a period of time, and to prevent further spread out of the area. The boundaries of the proposed “disease management zone” have not yet been set. Possible zone containment measures include controls on the movement of susceptible plants and plant parts out of the zone unless determined to be disease-free; decontamination precautions for high-risk activities such as hedge trimming; access restrictions; and maintenance of a disease-free buffer zone around the edge of the area. Eradication measures would be taken in consultation with

landowners and precautionary clearing of all *Rhododendron ponticum* within the zone is under consideration. Grant aid may be available toward the cost of clearing woodland sites; infected trees would only be removed if they became hazardous.

Chemical treatments are being investigated, but no treatments are currently known to be effective at eradicating *P. kernovii*. Burning plants is preferred over fungicides, which could suppress symptoms without eliminating infection. While infection is not believed to move down into roots, removal of rhododendron roots, rather than just cutting plants off at ground level, is thought to be beneficial because it would prevent re-growth of susceptible plants within the affected area. (12/04)

Histological studies of *Phytophthora ramorum* in Rhododendron twigs. Pogoda, F. and Werres, S. (2004). Canadian Journal of Botany 82, 1481-1489.

Abstract: Freshly cut Rhododendron twigs were inoculated with *Phytophthora ramorum* S. Werres, A.W.A.W. de Cock and W.A. Man in't Veld. Disease development (discoloration of the twigs) was observed. Tissue samples were taken for re-isolation and for histological studies from four different zones of the inoculated twigs. Thin sections were stained with toluidine blue O. Re-isolation of the pathogen was successful from all samples. The histological studies showed that *P. ramorum* was not only present in the brown zones of the Rhododendron twigs, but also in the healthy-looking green zones. Hyphae were found in different twig zones and in different tissues, but chlamydospores occurred only in brown twig zones where they developed mainly in the cortical parenchyma. Results from the histological studies provide a basis for how *P. ramorum* colonizes host tissue in Rhododendron twigs. (12/04)

First Report of Foliar Infection of *Maianthemum racemosum* by *Phytophthora ramorum*. D. Hüberli, K. L. Ivors, A. Smith, J. G. Tse, and M. Garbelotto. Department of ESPM-ES, 151 Hilgard Hall, University of California, Berkeley, CA 94720. Plant Disease. In press.

In May 2003, *Phytophthora ramorum* S. Werres & A.W.A.M. de Cock was isolated from the leaf tips of a single plant of false Solomon's seal (*Maianthemum racemosum* (L.) Link formerly known as *Smilacina racemosa* (L.) Desf.), a native, herbaceous perennial of the *Liliaceae* family, at Jack London State Park in Sonoma County, California. Affected leaves had cream to brown colored lesions on the tips which were delimited by a yellow chlorotic zone. Lesions on stems were not observed. The isolate (American Type Culture Collection, Manassas, VA, ATCC MYA-3280; Centraal Bureau voor Schimmelcultures, Baarn, the Netherlands, CBS 114391) was typical of *P. ramorum*, with large chlamydospores and caducous semi-papillate sporangia, and the sequence (GenBank Accession No. AY526570) of the internal transcribed spacer (ITS) region of the rDNA matched those published previously (4). The site, from which wood rose (*Rosa gymnocarpa*) was recently identified as a host, is a mixed forest containing confirmed *P. ramorum* infected coast redwood (*Sequoia sempervirens*), California bay laurel (*Umbellularia californica*), and tanoak (*Lithocarpus densiflora*) trees (2,3). Two leaves per asymptomatic, pesticide-free, potted-plant of false Solomon's seal were inoculated with zoospores of the *P. ramorum* isolate obtained from infected false Solomon's seal (1). Five plants were inoculated in trial 1 and the following day, 3 plants were inoculated in trial 2. A control leaf of each plant was dipped in sterile deionized water. Plants were enclosed in plastic bags, misted regularly with

sterile distilled water, and maintained at 16 to 21°C in the greenhouse. In both trials, plants did not have lesions on the leaves after 16 days and were reinoculated on separate days for each trial with higher concentrations of zoospores (1×10^5 (trial 1) and 2×10^5 (trial 2) zoospores/ml). Cream-colored lesions similar to those observed in the field were evident one week after the second inoculation and had stopped progressing in both trials by 17 days. Lesions starting from the leaf tips averaged in length 13 mm (range 8 to 24 mm), and *P. ramorum* was reisolated on *Phytophthora*-selective agar medium modified with 25 mg PCNB from 44% (trial 1) and 83% (trial 2) of all lesions (4). Control leaves had no lesions, and *P. ramorum* was not reisolated. Sporangia were not observed on any leaves when examined under the dissecting microscope. Because lesions developed only after a second inoculation with higher concentrations of zoospores and these lesions stopped progressing after 17 days suggests that false Solomon's seal is much less susceptible than other hosts, such as western starflower (*Trientalis latifolia*) (1) and wood rose (2). This is the first report of a plant from the *Liliaceae* as a natural host for *P. ramorum*, although *Smilax aspersa* was identified as being susceptible in artificial inoculations of detached leaves (E. Moralejo & L. Hernández, personal communication). False Solomon's seal is popular in the horticultural industry.

References: (1) D. Hüberli et al. Plant Dis. 87:599, 2003. (2) D. Hüberli et al. Plant Dis. 88:430, 2004. (3) P.E. Maloney et al. Plant Dis. 86:1274, 2002. (4) D.M. Rizzo et al. Plant Dis. 86:205, 2002. (12/04)

Efficacy of Heat-based Treatments in Eliminating the Recovery of the Sudden Oak Death Pathogen (*Phytophthora ramorum*) from Infected California Bay Laurel Leaves. Tamar Y. Harnik, Monica Mejia-Chang, James Lewis, and Matteo Garbelotto. HortScience Vol. 39(7):1677-1680. December 2004.

Abstract: *Phytophthora ramorum* (Oomycota) (Werres et al., 2001) is the plant pathogen responsible for the lethal disease of several oak species in California known as sudden oak death. The pathogen also causes a foliar disease on *Umbellularia californica* (bay laurel or simply bay). Bay leaves have been identified as the major source of natural inoculum in California coastal woodlands. Because of the epidemiological relevance of bay leaves, their movement needs to be regulated. Our study shows that *P. ramorum* is highly heat tolerant and can be reisolated from artificially inoculated bay laurel leaves placed at 55°C for up to 1 week. The pathogen cannot be recovered after 2 weeks at 55°C. Prolonged heat treatments, however, are impractical for bay leaves intended to be sold commercially as a spice, since they negatively impact the quality of the leaves. Here we describe a treatment involving a progressive and gradual heating process combined with the application of moderate vacuum. This method can be completed in 22 hours and is shown here to eliminate the recovery of *P. ramorum* without having a negative impact on the quality of the bay leaves. (1/04)

First report of ramorum bleeding canker on *Quercus falcata*, caused by *Phytophthora ramorum*. C. M. Brasier, S. Denman, J. Rose, S. A. Kirk, K. J. D. Hughes, R. L. Griffin, C. R. Lane, A. J. Inman, and J. F. Webber. Plant Pathology (December 2004) 53, 804.

Phytophthora ramorum (Werres et al., 2001) is the cause of a bleeding canker of native American oaks in California and southern Oregon, USA, known as sudden oak death (Rizzo et

al., 2002). In Europe, *P. ramorum* has caused dieback and leaf blight of various shrubs, especially *Rhododendron* (e.g. Lane *et al.*, 2003). Many European trees are potentially susceptible to *P. ramorum* (Brasier *et al.*, 2002). Trees at woodland and garden sites in the UK with infected rhododendrons are therefore being monitored.

In October 2003, a mature 60-cm-diameter American southern red oak, *Quercus falcata*, was found in southeast England with 'bleeding' in the lower 1 m of the trunk. Samples taken at ~2 m above ground level revealed fresh lesion edges in the inner bark, consistent with a phytophthora bark necrosis, girdling the entire circumference of the tree. The lesion edges were mottled (i.e. with islands of necrotic and healthy tissue) and pale orange-brown to red-brown. Staining extended ~3 mm into the outer wood vessels. Older lesion areas extended down to the root flares and were a darker red-brown. Extensive frass, indicating bark beetle colonization of the stressed tree, was present to 1 m and fresh frass was present sporadically to ~2 m.

When samples of inner bark from lesion edges were plated onto a selective medium, a *Phytophthora* sp. was consistently isolated. On carrot agar, isolates exhibited the combination of temperature-growth relationships, sporangia, chlamydospores and denticulate hyphae unique to *P. ramorum* (Werres *et al.*, 2001). Its ITS sequence (AY616757) was identical to that of other *P. ramorum* isolates. Physiological and genetic analyses showed the isolates were of A1 sexual compatibility type and conformed to the European population of *P. ramorum*. When wound-inoculated (Brasier *et al.*, 2002) into bark of 100-cm-diameter *Q. falcata* branch material, the pathogen caused long lesions (~70mm) in 5 weeks and was successfully reisolated. Control agar plugs only caused a few mm of bark discoloration.

This is the first report of ramorum bleeding canker in the UK. *Quercus falcata* is a close relative of American northern red oak, *Q. rubra*, a common plantation or ornamental tree in the UK and Europe. Bark of mature *Q. rubra* is susceptible to *P. ramorum* on inoculation (Brasier *et al.*, 2002) and two trees have been found naturally infected in the Netherlands (P. D. de Gruyter, Wageningen, personal communication). Both *Q. falcata* and *Q. rubra* are therefore at risk from *P. ramorum*. (1/04)

Isolation and characterization of microsatellite markers in *Phytophthora ramorum*, the causal agent of sudden oak death. S. Prospero, J. A. Black, and L. M. Winton. Molecular Ecology Notes (2004) 4, 672-674.

Abstract: We describe specific primers and conditions to amplify two dinucleotide and five trinucleotide microsatellite DNA loci isolated from the oomycete *Phytophthora ramorum*, the causal agent of sudden oak death. The primer sets were tested on 14-30 isolates from North America and Europe. Seven of 14 loci differentiated between A1 and A2 mating types. All seven loci successfully amplified DNA isolated from infected plant tissue. Four loci may be useful for the diagnosis of *P. ramorum* because they do not amplify closely related *Phytophthora* species. (1/04)

Support vector machines for predicting distribution of Sudden Oak Death in California. Qinghua Guo, Maggi Kelly, Catherine H. Graham. Ecological Modelling 182 (2005) 75-90. In press.

In the central California coastal forests, a newly discovered virulent pathogen (*Phytophthora ramorum*) has killed hundreds of thousands of native oak trees. Predicting the potential distribution of the disease in California remains an urgent demand of regulators and scientists. Most methods used to map potential ranges of species (e.g. multivariate or logistic regression) require both presence and absence data, the latter of which are not always feasibly collected, and thus the methods often require the generation of 'pseudo' absence data. Other methods (e.g. BIOCLIM and DOMAIN) seek to model the presence-only data directly. In this study, we present alternative methods to conventional approaches to modeling by developing support vector machines (SVMs), which are the new generation of machine learning algorithms used to find optimal separability between classes within datasets, to predict the potential distribution of Sudden Oak Death in California. We compared the performances of two types of SVMs models: two-class SVMs with 'pseudo' absence data and one-class SVMs. Both models performed well. The one-class SVMs have a slightly better true-positive rate (0.9272 ± 0.0460 S.D.) than the two-class SVMs (0.9105 ± 0.0712 S.D.). However, the area predicted to be at risk for the disease using the one-class SVMs (18,441 km²) is much larger than that of the two-class SVMs (13,828 km²). Both models show that the majority of disease risk will occur in coastal areas. Compared with the results of two-class SVMs, the one-class SVMs predict a potential risk in the foothills of the Sierra Nevada mountain ranges; much greater risks are also found in Los Angeles and Humboldt Counties. We believe the support vector machines when coupled with geographic information system (GIS) will be a useful method to deal with presence-only data in ecological analysis over a range of scales. (1/04)

The first report of *Phytophthora ramorum* on *Camellia japonica* in Spain was published in Plant Disease, Nov. 2003, Vol. 87, Number 11. (1/04)

D. Hüberli, K. D. Reuther, A. Smith, S. Swain, J. G. Tse, and M. Garbelotto. First report of foliar blight of *Rosa gymnocarpa* by *Phytophthora ramorum*. Plant Disease April 2004, Vol. 88, #4. (4/04)

Hayden, K. J.; Rizzo, D. M.; Tse, J.; and Garbelotto, M. Detection and quantification of *Phytophthora ramorum* from California forests using a real-time PCR assay. Phytopathology. In press. (6/04)

Kroon, L. P. N. M., Verstappen, E. C. P., Kox, L. F. F., Flier, W. G., and Bonants, P. J. M. 2004. A Rapid Diagnostic Test to Distinguish Between American and European Populations of *Phytophthora ramorum*. Phytopathology 94:613-620. (6/04)

Martin, F. N., Tooley, P. W., and Blomquist, C. 2004. Molecular detection of *Phytophthora ramorum*, the causal agent of sudden oak death in California, and two additional species commonly recovered from diseased plant material. Phytopathology 94:621-631. (6/04)

Frank N. Martin and Paul W. Tooley. Phylogenetic relationships of *Phytophthora ramorum*, *P. nemorosa*, and *P. pseudosyringae*, three species recovered from areas in California with sudden oak death. Mycol. Res. 107 (12): 1379-1391 (December 2003). The British Mycological Society. (6/04)

Tooley, P. W.; Kyde, K. L.; and Englander, L. 2004. Susceptibility of Selected Ericaceous Ornamental Host Species to *Phytophthora ramorum*. Plant Disease. In press. (6/04)

Rapid identification of *Phytophthora ramorum* using PCR-SSCP analysis of ribosomal DNA ITS-1. P. Kong, C. X. Hong, P. W. Tooley, K. Ivors, M. Garbelotto, and P. A. Richardson. 2004. Letters in Applied Microbiology 2004, 38, 433-439. (6/04)

The British Society for Plant Pathology has posted the First report of ramorum bleeding canker on *Quercus falcata*, caused by *Phytophthora ramorum* C.M. Brasier, S. Denman[a], J. Rosea, S.A. Kirka, K.J.D. Hughes, R.L. Griffin, C.R. Lane, A.J. Inman and J.F. Webber at www.bspp.org.uk/ndr/july2004/2004-31.asp. (6/04)

Surveying For and Eradicating *Phytophthora ramorum* in Agricultural Commodities. N. K. Osterbauer, J. A. Griesbach, and J. Hedberg. 9 March 2004. Plant Health Progress, <http://www.plantmanagementnetwork.org/php/2004.asp>. (6/04)

Sudden Oak Death: A Tale of Two Continents. Matteo Garbelotto, Extension Specialist and Adjunct Professor, Department of Environmental Science, Policy and Management, University of California, Berkeley, CA, USA describes this new disease of oaks and related trees and compares the infection potential in the U.S. and Europe. (6/04)

Ross Meentemeyer, David Rizzo, Walter Mark, and Elizabeth Lotz. Mapping the Risk of Establishment and Spread of Sudden Oak Death in California. Forest Ecology and Management. In press. (7/04)

Sudden Oak Death (*P. ramorum*) Discovered on Trees in Europe. Clive Brasier, Sandra Denman, Anna Brown, and Joan Webber; Forest Research Agency, Alice Holt Lodge, Farnham, Surrey GU10 4LH, UK. *Mycological Research News* 108(10): 1107-1100 (October 2004). (11/04)

FUNDING

The Gordon and Betty Moore Foundation awarded \$2,484,184 for *P. ramorum* research to Matteo Garbelotto, Richard Dodd, and Ellen Simms of UC Berkeley and David Rizzo, UC Davis. The three-year grant covers control, resistance, genetics, epidemiology, and other *P. ramorum*-related topics. (2/04)

The federal government is providing \$7.4 million in funding for Sudden Oak Death in 2004. \$1.4 million will be allocated to the USDA ARS for research on horticultural aspects of *P. ramorum*, including \$250,000 for a new genomics research program at the UC Davis ARS laboratory for analysis of resistance to the pathogen. USDA APHIS received \$2 million for *P. ramorum* quarantine enforcement, inspection, and monitoring. In addition, USDA FS Research received \$2 million for Sudden Oak Death research. A portion of these funds will be used to hire a forest pathology/*P. ramorum* researcher at the Pacific Southwest Research Station. Also \$1.7 million was awarded to the USDA FS, State and Private Forestry for Sudden Oak Death management, monitoring, and education. (2/04)

On May 18, USDA Secretary Ann Veneman transferred \$15.5 million from the USDA CCC to APHIS PPQ in order to help halt the spread of *P. ramorum* to non-infested areas of the US. When added to the \$2.5 million that APHIS has already provided for the national survey and the \$2 million of appropriated funds, USDA PPQ has committed \$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. The PPQ Western Region received more than \$12 million dollars, with nearly \$7 million going to support activities in CA. The Eastern Region got \$2.5 million to support emergency actions and the national survey in states east of the Mississippi River. Additionally, nearly \$500,000 has been dedicated to laboratory diagnostics through the National Plant Diagnostic Network and other laboratories. (6/04)

Funded projects for the FY'04 USDA FS Pacific Southwest Research Station (PSW), *P. ramorum* Request for Proposals were selected. PSW funded 15 proposals, allocating slightly over \$1 million during this funding cycle. Projects chosen represent a broad array of needed research, and include research in the eastern US as well as international interests. (7/04)

LEGISLATION

US Senators Barbara Boxer (D-CA) and Gordon Smith (R-OR) introduced the Sudden Oak Death Syndrome Control Act of 2004 (S. 2575) on June 24, 2004. The legislation authorizes the USDA to continue its research program and develop methods to control, manage, and eradicate Sudden Oak Death (*P. ramorum*). If passed, the bill would require the USDA to conduct management, treatment, and fire prevention activities and establish public education and outreach. Additionally, under the legislation, the USDA would regularly meet with federal, state, tribal, and local government officials to exchange information and recommendations. The Act authorizes \$44.2 million annually, including \$25 million for USDA research, regulation, and monitoring; \$18.5 million for management, treatment, and fire; and \$700,000 for education and outreach. (7/04)

US Representatives Max Burns (R-GA) and David Scott (D-GA) introduced legislation (H.R. 4569) supporting and expanding efforts to halt the spread of the *P. ramorum* on 6/15. The legislation authorizes the USDA to identify all the possible host plants for this disease; determine how widespread the outbreak has become; research past and current control, quarantine, and hazardous fuel reduction methods; and identify a workable national plan with cost estimates to eradicate the disease. (7/04)

The US House of Representatives unanimously passed the “National Plan for the Control and Management of Sudden Oak Death” (H.R.4569 Burns, GA) on 10/5/04. The legislation does not appropriate funds for disease management, but it does authorize the USDA to identify all possible host plants for *P. ramorum*; determine the national scope of the pathogen; research past and current control, quarantine, and hazardous fuel reduction methods; and identify a national plan with cost estimates for disease eradication. The bill will be heard in the Senate when they are back in session. (11/04)

Omnibus appropriations for federal *P. ramorum* funding in 2005 totaled \$9.89 million. The Agricultural Appropriations Bill earmarked \$1.45 million for the 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.

The Omnibus bill also included legislation to recognize the oak tree as America's national tree (Nelson, NE/Goodlatte, VA). Once President Bush signs the Bill, the oak will officially become America's national tree. During a four-month-long open voting process sponsored by the National Arbor Day Foundation in 2001, the oak tree earned the title of America's Chosen National Tree. The oak itself is found in all 50 states and is considered an important part of America's history and culture. (12/04)

RESOURCES

“*Phytophthora ramorum* a guide for Oregon nurseries,” by J. Parke, J. Pscheidt, and R. Linderman has been published by Oregon State University Extension Service (Publication EM8840). A pdf version is posted at <http://eesc.oregonstate.edu/agcomwebfile/edmat/em8840.pdf>. (2/04)

The new UK publication “*Phytophthora ramorum* a threat to our trees, woodland and heathland” has been posted to the DEFRA website at: <http://www.defra.gov.uk/planth/pestnote/newram.pdf>. The pest note provides basic information on *P. ramorum* in the UK. The UK Forestry Commission also posted *P. ramorum* Frequently Asked Questions to their site at: <http://www.forestry.gov.uk/forestry/INFD-5UBESN>, and symptoms on several hosts are displayed in Path News (Issue 6, Dec 2003) from Forestry Research [http://www.forestry.gov.uk/pdf/pathnews06.pdf/\\$FILE/pathnews06.pdf](http://www.forestry.gov.uk/pdf/pathnews06.pdf/$FILE/pathnews06.pdf). (3/04)

CDFA has posted statewide Sudden Oak Death survey information to its website at: http://www.cdfa.ca.gov/phpps/pe/sod_survey. The site offers information on CA nursery survey results and protocols, federal infested nursery protocol, shipping restrictions, and frequently asked questions. (4/04)

The USDA PPQ program has implemented 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 at Monrovia Nursery, Los Angeles County, and Specialty Plants Inc., San Diego County. (4/04)

The COMTF has posted a US *P. ramorum* Nursery Chronology to its homepage (www.suddenoakdeath.org), in addition to adding a Nursery Section to the site. (5/04)

A summary pest risk assessment for a new *Phytophthora* species affecting European beech (*Fagus sylvatica*) and rhododendron (*Rhododendron* spp.) has been posted to the DEFRA website at <http://www.defra.gov.uk/planth/praf/forest.pdf>. The new species was identified by researchers at the UK Forestry Commission, Forest Research Agency in mid-November 2003, while looking for *P. ramorum* in natural settings. The positive isolates were from a large bleeding canker of a mature European beech tree in southwest England. (6/04)

The Oregon State University Extension and Experiment Station has developed a new website on information about Sudden Oak Death in OR. Postings include technical documents, magazine articles, and Oregon State University news releases. To view the site, go to: http://extension.oregonstate.edu/emergency/oak_death.php . (7/04)

National Invasive Species Council has featured Sudden Oak Death as the "Invasive of the month" for July. (7/04)

The redesign of the COMTF website is complete and available at www.suddenoakdeath.org. New features include an image library, virtual training session, and user-friendly drop-down menus. Additional information and site populating will continue over the next several months; updates will be ongoing. (9/04)

The USDA FS has posted a new *P. ramorum* report, "Sudden Oak Death: Protecting America's Woodlands from *Phytophthora ramorum*" to its website at: http://www.fs.fed.us/foresthealth/publications/SOD_Report.pdf. The report addresses the USDA FS's comprehensive six-part strategy to allocate resources for managing Sudden Oak Death, as well as provides up-to-date pathogen information and colorful illustrations. (10/04)

The Nature Conservancy has posted a "Gallery of Pests" to its website at: <http://tncweeds.ucdavis.edu/products/gallery/gallery.html>. Pathogens such as *P. ramorum* can be found by regions threatened. General information is available for the pest, along with photos and useful website references. (10/04)

The USDA CSREES National Integrated Pest Management (IPM) Centers and the National Plant Diagnostic Network assembled a national Master Gardener information campaign. The "*Phytophthora ramorum*: Educate to Detect (PRED)" nationwide training session for Master Gardeners was held on 10/26/04. The training session was the first step in educating Master Gardeners and other ornamental support staff on the history and biology of the pathogen, symptoms and common look-alikes, regulations, and sample submission procedures. At 115 training sites in more than 40 states across the nation, over 730 participants simultaneously viewed a PowerPoint slideshow and listened to narration through a conference call line. A panel of experts answered questions following the presentation. CA hosted 12 training centers across the state, primarily at UCCE offices. The USDA FS provided funding for this cooperative effort between the above agencies and USDA APHIS, the National Plant Board, State Agriculture Departments, Master Gardeners, State Foresters, and many others. The PRED training materials can be found at the North Central IPM Center website at: <http://ncipm.org/sod/> or the COMTF website at: www.suddenoakdeath.org. (10/04)

The draft report from the USDA APHIS PPQ *P. ramorum* Science Panel Workshop is available at: <http://www.aphis.usda.gov/ppq/ispm/sod/sciencepanel.html>. The panel of 75 North American and European scientists and regulators with *P. ramorum* expertise reviewed and discussed current scientific information on *P. ramorum* biology. The discussions were captured in 65 questions from six categories: General, Biology and Ecology, Epidemiology, Control and Eradication, Survey and Monitoring, and Diagnostics. (11/04)

“*P. ramorum* – a guide for Washington nurseries” is now available. The guide covers host and associated plant species, host symptoms, pathogen biology, disease prevention, cultural management, protection and suppression with fungicides, and detection and eradication. It also offers resources for further information and updates and has many descriptive color photos. For a copy of the guide, go to the Washington State Nursery and Landscape Association website at: <http://www.wsnla.org/cgi-bin/artman/exec/search.cgi?cat=39&start=6&perpage=5&template=index/news.html>. (11/04)

The COMTF Executive Committee met on 9/23 for an annual Strategic Planning Session. Agenda items included review of the Task Force Mission and Goals statement and the 2004 Work Plan, as well as development of the 2005 Work Plan. To access these documents, go to: <http://www.suddenoakdeath.org>. (11/04)

The federal “Confirmed Residential Protocol for *Phytophthora ramorum* Detections in Landscaped Residential or Commercial Settings” has been posted to the USDA APHIS PPQ website at: <http://www.aphis.usda.gov/ppq/ispm/sod/>. The protocol describes actions to be taken by regulatory officials when *P. ramorum*-positive plants are found in home gardens and other landscaped areas. (12/04)

DEFRA posted “*P. ramorum* Frequently Asked Questions” to its website 11/24/04. The FAQ sheet can be found at: <http://www.defra.gov.uk/planth/pramorum8.htm>. Also posted is an FAQ on *P. kernovii*. This document can be found at: <http://www.defra.gov.uk/planth/kernovii/kernqa.pdf>. (1/04)

The SODBusters website, providing technical information and the details of the two *P. ramorum*-infested plant material collection yards, can be found at: <http://groups.ucanr.org/SODBusters>. A toll-free telephone number is also available for anyone needing more information or assistance with the program – (866) SOD-7411. (2004 summary)

FEATURED HOSTS AND ASSOCIATED HOSTS

European beech (*Fagus sylvatica*) - To date, only two beech trees in Cornwall, England have been found with bark cankers and bleeding symptoms similar to those on true oaks and tanoak in CA. Inoculation studies indicate European beech is highly susceptible to *P. ramorum* (<http://www.defra.gov.uk/planth/pramorum8.htm>), but European beech's susceptibility in a natural setting is not yet fully understood. (1/04)

Holm oak (*Quercus ilex*) - *P. ramorum* affected only the leaves of the four infected holm oaks detected in Cornwall, England. In CA, *P. ramorum* infects oak through the bark. Primarily only oaks in the red oak group are susceptible, and the leaves are not infected. Holm oak is a member of the white oak group, which may explain why the leaves are susceptible. (1/04)

European Turkey oak (*Quercus cerris*) - *P. ramorum* caused bleeding cankers on infected European Turkey oak found near Cornwall, England. (2/04)

***Rosa gymnocarpa* (baldhip rose, wood rose, or dwarf rose) - *P. ramorum* was isolated from** wood rose leaflets at Jack London State Park in Sonoma County, CA. The confirmation site was

a mixed forest containing *P. ramorum*-infected coast redwood, California bay laurel, and tanoak. Affected leaflets had cream to brown colored lesions, sometimes delimited by a chlorotic zone. Lesions coalesced with time and spread into the stem. (4/04)

***Pyracantha koidzumii* (Formosa firethorn) - *P. ramorum* symptoms found on *Pyracantha* by the CFIA in a Vancouver area nursery were limited to leafspots. The detection was made as part of the Monrovia trace-forward inspections. Koch's postulates have not yet been completed. (5/04)**

***Clintonia andrewsiana* (Andrew's clintonia bead lily/Andrew's clintonia/Red clintonia/blue-bead lily) – *P. ramorum*-infected Andrew's clintonia bead lily was found 3/04 at Muir Woods National Monument, Marin County. The infected plants were under a canopy of redwoods and infected California bay laurel. Symptoms included lesions both at the tip and base of the leaves. Over time, necrotic tissue develops a shot hole appearance. (8/04)**

***Dryopteris arguta* (California wood fern/coastal wood fern) - Infected coastal wood fern was found at Fairfield Osborne Preserve in Sonoma County, CA in a coast live oak/California bay laurel forest. Symptoms were necrotic frond tips. This host find is significant because previously identified *P. ramorum* hosts were limited to plants with seeds: Gymnosperms (Douglas-fir, coast redwood, yew, and grand fir) and a wide range of Angiosperms (broadleaf plants). This is the first known *P. ramorum*-susceptible species in the fern group (Division Pteridophyta). (8/04)**

***Smilacina racemosa* (false Solomon's seal/Solomon's plume) - *P. ramorum*-infected false Solomon's seal was found in spring 2004 at Jack London State Park, Sonoma Co., CA when necrotic leaf tip symptoms were identified. (8/04)**

***Taxus brevifolia* (Pacific yew) - Infected Pacific yew have been found at one location in Mendocino County, CA, by John Bienapfl, UC Davis, growing under a canopy of California bay laurel, tanoak, and madrone. *P. ramorum* symptoms include needle and twig dieback. (8/04)**

***Drimys winteri* (Winter's-bark) – *P. ramorum*-infected Winter's-bark was found in Southwest England, December 2003. The plant was a large bush shape, and exhibited foliar blight as well as shoot dieback. Numerous infected rhododendrons were also found in the vicinity. To date, Koch's postulates have not been completed, as the host was originally thought to be a rhododendron, so the isolate was discarded. (9/04)**

***Laurus nobilis* (Sweet bay laurel) – *P. ramorum*-infected Sweet bay laurel was identified 5/04 in a Southwest England nursery. The infested plants were container-grown and exhibited foliar blight symptoms. Other infected container-grown plants were also identified at the nursery. Koch's postulates have been completed. Once the UK reports its completed findings to APHIS, and APHIS reviews and accepts the information, *Laurus nobilis* will be moved from the associated host list to the host list. (9/04)**

Salix caprea cv *Kilmarnock* (Goat willow) – *P. ramorum*-infected Goat willow was found in container-grown plants in Northwest England, July 2004. Symptomatic plants exhibited foliar blight and aerial dieback. Koch's postulates have not yet been completed. (9/04)

Calluna vulgaris – **Scotch Heather (Ericaceae)** – Added to the USDA APHIS associated host list in August, infected *Calluna vulgaris* was identified in Polish container ornamental nurseries. Symptoms were observed on plants near the nursery road, and included cankers on 2 – 4 cm shoots, as well as shepherd crook tips. Koch's postulates have not been completed. (10/04)

Viburnum x rhytidophylloides - **Alleghany or Willowood Viburnum (Caprifoliaceae)** – *P. ramorum*-positive *Viburnum x rhytidophylloides* were identified in a Washington County, OR nursery that irrigates from overhead sprinklers. Initial samples were taken on 6/24/04. Infected plants were located adjacent to other non-symptomatic Viburnums. Alleghany Viburnum symptoms were limited to lower leaf discoloration. Results on subsequent samples to verify whether other plants were infected are pending. (11/04)

Photinia fraseri - **Red tip or Fraser's photinia (Rosaceae)** – *P. ramorum* was isolated from *Photinia fraseri* in 2003 from a nursery in Poland. To date, no symptomatic Red tip has been identified in 2004. Confirmed plants were originally imported from Western Europe. Symptoms were limited to leaf blight and resembled *P. ramorum* leaf spots on rhododendron. All symptomatic plants were destroyed; the grower chose to stop growing Red tip at the nursery since it is not an important ornamental plant in Poland. (11/04)

OUTREACH ACTIVITIES

1/28 – Free “Detection and Control of *P. ramorum* in Nurseries” Training; Watsonville, CA

2/3 – Free “Detection and Control of *P. ramorum* in Nurseries” Training; Woodland, CA

2/29 - 3/14 - The Art of Saving Oaks; University of California Santa Cruz

3/9 - 3/10 –COMTF Spring Meeting and Field Trip, Sonoma State University; Fairfield Osborn Preserve and Research Update; Rohnert Park, CA

3/24 - Sudden Oak Death Workshop: Current research and treatment strategies; Tree Care Industry Association Expo; Sacramento, CA

4/22 – Free “Recognition, Sampling, Treatment, and Mitigation Measures for Sudden Oak Death;” Training; Felton, CA

5/10 – Free “Sudden Oak Death Workshop for Tribal Members;” Santa Rosa, CA

5/12 – Free “*P. ramorum* in Nurseries: Diagnosis and Control;” Training; San Diego County, CA

5/13 – Free “*P. ramorum* in Nurseries: Diagnosis and Control;” Training; Los Angeles County, CA

5/19 – Free “Recognition, Sampling, Treatment, and Mitigation Measures for Sudden Oak Death;” Training; San Rafael, CA

7/7 - Free “*P. ramorum* in Nurseries: Diagnosis and Control;” Training; Modesto, CA

10/26 – USDA CSREES National IPM Centers and the National Plant Diagnostic Network national Master Gardener *P. ramorum* training session

11/4 – “*P. ramorum* (Sudden Oak Death) Issues in Nurseries;” Eureka, CA

12/2 – “Conservation Planning for California's Oak Woodlands;” Riverside, CA

PERSONNEL CHANGES

Dave Rizzo, UC Davis, hired four new staff members: James W. Zanzot, a technician collaborating with researchers at Sonoma State University investigating the spread of *P. ramorum* in the Sonoma Mountain area; Shannon Murphy, a post-graduate researcher focusing on research, detection, and monitoring of *P. ramorum* across watersheds throughout CA; John Bienapfl, conducting field-based research and extension activities; and Elizabeth Fichtner, investigating soil ecology of *P. ramorum* in forest soils with an emphasis on propagule survival and pathogenesis in the soil environment. (2/04)

Chris Lee (see [photo](#)) is working for UCCE in Humboldt/Del Norte Counties, where he coordinates both educational and field detection-related activities pertaining to *P. ramorum*. Chris can be reached at cale@ucdavis.edu or (707) 445-7351. (3/04)

Katie Palmieri rejoined the Task Force and is working at UC Berkeley. She is the COMTF Public Information Officer, dealing with media-related outreach, Task Force coordination, and public education. She also works in a similar capacity for the Sudden Oak Death Research Committee and Pacific Southwest Research Station. Katie can be reached at palmieri@nature.berkeley.edu or (510) 847-5482. (3/04)

[Dr. Niklaus J. Grünwald](#), research plant pathologist, joined USDA ARS Horticultural Crops Research Laboratory staff at Oregon State University. There he conducts research on nursery crop diseases, including the biology, epidemiology, and control of *P. ramorum*. Nik can be reached at (541) 738-4049. (7/04)

Jennifer Falacy replaced Art Wagner in his role as the WSDA Pathologist after Art vacated his position. Jennifer can be reached at jfalacy@agr.wa.gov or (360) 586-5309. (7/04)

Kelly Ivors left her position as a post-doc in the Garbelotto lab at UC Berkeley and has taken an assistant professor position of plant pathology with North Carolina State University. Kelly is now located at the Mountain Horticultural Crops Research and Extension Center near Asheville, NC. There she conducts pathology-related research on the economically important crops of western NC. Kelly can be reached at kelly_ivors@ncsu.edu. (7/04)

The COMTF Southern Regional Coordinator Karl Buermeyer moved to Hawaii. His position will not be filled. Any inquiries should be directed to Janice Alexander, COMTF Outreach Coordinator, at (415) 499-3041 or JAlexander@co.marin.ca.us, or Katie Palmieri, COMTF Public Information Officer, at (510) 847-5482 or palmieri@nature.berkeley.edu. (8/04)

The COMTF Coordinator Lucia Briggs left the Task Force for a position in the UC Berkeley Chemistry Department. Her position will not be filled. Any inquiries should be directed to Katie Palmieri, COMTF Public Information Officer, at (510) 847-5482 or palmieri@nature.berkeley.edu or Janice Alexander, COMTF Outreach Coordinator, at (415) 499-3041 or jalexander@ucdavis.edu. (9/04)

Dr. Pedro Uribe is a new post-doctoral research associate with USDA ARS working on molecular detection of *P. ramorum*. He is working in Salinas with Dr. Frank Martin, but also collaborates with Drs. Paul Tooley and Nina Shishkoff at the USDA ARS lab in Fort Detrick, MD. The focus of his project will be optimizing the molecular detection methods for *P. ramorum* (primarily the mitochondrial marker system for traditional and real-time PCR) and additional field validation of the technique. Dr. Uribe can be reached at (831) 755-2800. (11/04)