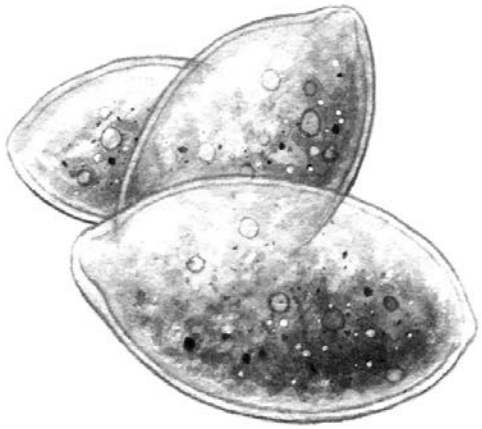
CALIFORNIA OAK MORTALITY TASK FORCE

2007
Sudden Oak Death and *Phytophthora ramorum*
Summary Report

A Compendium of Monthly Newsletters



Phytophthora ramorum

Katie Palmieri, California Oak Mortality Task Force
US Forest Service, Pacific Southwest Research Station
UC Berkeley Center for Forestry

Susan J. Frankel, Sudden Oak Death Research Program Manager
US Forest Service, Pacific Southwest Research Station, Albany

Cover drawing by Tim Gunther
Gunther Graphics, Carlsbad, CA.

TABLE OF CONTENTS

2007 SIGNIFICANT EVENTS

- Sudden Oak Death mortality increases in coastal California as a result of infections that began during 2005 and 2006, when warm, wet springs created optimal pathogen conditions. Coast live oak and tanoak die-off rates are their highest to date.
- In Oregon, despite 6 years of eradication efforts, the number of dead trees detected is at an historic high, with new infections detected several miles beyond the quarantine boundary. Oregon publishes a notice to expand the area under quarantine for *P. ramorum* in Curry County to 166 sq. mi.
- Three *P. ramorum* isolates from plants and soil at a retail nursery in Humboldt County are determined to be of the European *P. ramorum* lineage. This is the first time the European *P. ramorum* strain has been confirmed in California.
- *P. ramorum* is detected in Norton Creek (northern Humboldt County) in the summer of 2006 and the spring of 2007. The genotyped isolates are found to be the Northern American (NA1) lineage and European (EU1) lineage. This is the first time the EU1 lineage is found in a North American forest site. The location of the inoculum source is not determined,despite extensive riparian area vegetation surveys.
- *P. ramorum* is detected in the Sammamish River in King County, WA downstream from several confirmed nurseries. The source of inoculum for the stream confirmation has not been determined.
- A drainage ditch from a *P. ramorum*-positive nursery in Mississipi is found to have *P. ramorum*-infested water.
- Six new *P. ramorum* hosts are identified this year: Chinese guger tree, Kinnikinnik, Dwarf English Laurel, Delavay Osmanthus, Oregon Grape, and Silk tassel bush.
- There are 21 positive *P. ramorum* nursery finds nationwide. The states with positive finds/detections are: CA(7), OR(2), WA(7), FL(1), GA(3), and MS(1).
- Rhododendrons planted along a residential roadway were found *P. ramorum* positive in Thurston County, WA.
- Two *P. ramorum* A2 mating type isolates from the EU lineage are identified in Belgium. The two isolates, taken from Belgium nurseries, consistently produce oospores when mated with *P. ramorum* EU A1 isolates and not when mated with NA A2 isolates or with the first EU A2 isolate.
- The number of newly identified *Phytophthora* species, as well as new geographic areas and hosts, is rapidly expanding, as is the number of forest *Phytophthora* species found in ornamental nurseries. In 2007, several new *Phytophthora* species were discovered, including *Phytophthora pinifolia* in Chile, causing widespread defoliation and mortality in *Pinus radiata* plantations.

MONITORING

***P. ramorum* continues to spread in Mendocino County with new detections north of** Elk. SOD is now present in patches along the Highway 128 corridor from Highway 101 west, to within 4 miles of the Pacific Ocean. This new find was part of the 2006 California "Early Detection of the Infectious Forest Disease Sudden Oak Death" survey, which assessed 244 sites in Mendocino, Humboldt, Del Norte, and San Luis Obispo Counties. To date, results have identified one *P. ramorum*-positive site on a private parcel in southwestern Mendocino County (18 km from a known infested location) as well as the site to the north near Elk in Navarro River Redwoods SP that is approximately 30 km from the nearest infested site. (2/07)

The 2007 National *P. ramorum* Early Detection Stream Baiting Survey for Forests has recovered two *P. ramorum*-positive samples, one from WA state and one from MS. The WA sample was recovered in a western WA river, east of Seattle, and downstream from several confirmed nurseries, though the source of the inoculum has not been determined. The MS water baiting confirmation was made from a ditch draining a *P. ramorum*-positive nursery. The pathogen has not been detected in vegetation outside the nursery. (5/07)

OR identified a new *P. ramorum* outbreak 1.5 miles north of the quarantine area. The site, on federal land administered by the USDI BLM, was detected in early March during ground-based surveys that were being conducted as a follow-up to a positive water baiting sample. A one-inch diameter live tanoak with a bleeding canker located approximately 500 feet upstream from the water find was determined to be the source of inoculum. An eradication treatment area boundary of 300 feet was immediately established around the known affected tanoak, totaling approximately 4.9 acres. A quarantine area that extends approximately one-half mile in all directions from the affected tree was also established. (6/07)

Follow-up soil, vegetation, and stream baiting survey efforts from the MS *P. ramorum*-positive water confirmation have been all been negative for the pathogen. Survey activities will continue with additional sampling in the fall when weather conditions are more conducive to pathogen activity. (7/07)

***P. ramorum* inoculum was baited from Norton Creek in northern Humboldt County** early in the summer of 2006, with a repeat detection in the spring of 2007. The recovered isolates were genotyped in October 2007, which revealed that two lineages had been detected: the Northern American (NA1) and European (EU1). This is the first find in North America of the EU1 lineage in a wildland environment. Efforts are being made to determine the spore source location, including exhaustive streamside surveys, but none has yet revealed the source. A small retail nursery in downtown McKinleyville has been found to have *P. ramorum*-positive plants, including three plants confirmed with the EU1 strain, but the nursery is located in a different watershed than the infested stream. No definitive linkages between the nursery and stream have been established. This stream positive is 47 miles north of the northern most known wildland infestation in California. (11/07)

PUBLISHED *PHYTOPHTHORA RAMORUM*-RELATED RESEARCH

Belbahri, L.; Calmin, G.; Wagner, S.; Moralejo, E.; Woodward, S.; Lefort, F. 2007. Specific hybridization real-time PCR probes for *Phytophthora ramorum* detection and diagnosis. Forest Pathology 37 403–408. DOI: 10.1111/j.1439-0329.2007.00517.x. (12/07)

Bilodeau, G.J.; Lévesque, C.A.; de Cock, A.W.A.M.; Duchaine, C.; Brière, S.; Uribe, P.; Martin, F.N.; Hamelin, R.C. 2007. Molecular detection of *Phytophthora ramorum* by real-time polymerase chain reaction using TaqMan, SYBR Green, and molecular beacons. Phytopathology 97:632-642. (6/07)

Brown, A.V.; Brasier, C.M. 2007. Colonization of tree xylem by *Phytophthora ramorum, P. kernoviae* and other *Phytophthora* species. Plant Pathology DOI: 10.1111/j.1365-3059.2006.01511.x. (2/07)

Condeso, T. Emiko; Meentemeyer, Ross K. 2007. Effects of landscape heterogeneity on the emerging forest disease sudden oak death. Journal of Ecology 95: 364–375. DOI: 10.1111/j.1365-2745.2006.01206.x. (4/07)

Dart, N.L.; Chastagner, G.A. 2007. Estimated economic losses associated with the destruction of plants due to *Phytophthora ramorum* quarantine efforts in Washington State. Online. Plant Health Progress DOI: 10.1094/PHP-2007-0508-02-RS. (6/07)

Dart, N.L.; Chastagner, G.A. 2007. High recovery rate of *Phytophthora* from containerized nursery stock pots at a retail nursery highlights potential for spreading exotic oomycetes. Plant Health Progress DOI: 10.1094/PHP-2007-0816-01-BR. Online at: http://www.plantmanagementnetwork.org/php/default.asp. (9/07)

Dart, N.L.; Chastagner, G.A.; Rugarber, E.F.; Riley, K.L. 2007. Recovery frequency of *Phytophthora ramorum* and other *Phytophthora* spp. in the soil profile of ornamental retail nurseries. Plant Disease 91:1419-1422. DOI: 10.1094/PDIS-91-11-1419. (11/07)

Donahoo, Ryan; Blomquist, Cheryl L.; Thomas, Samantha L.; Moulton, John K.; Cooke, David E.L.; Lamour, Kurt Haas. 2006. *Phytophthora foliorum* sp. nov., a new species causing leaf blight of azalea. Mycological Research 110:1309 – 1322. Available online at www.sciencedirect.com. (3/07)

Fichtner, E.J.; Lynch, S.C.; Rizzo, D.M. 2007. Detection, distribution, survival, and sporulation of *Phytophthora ramorum* in a California redwood-tanoak forest soil. Phytopathology 97:1366-1375. (10/07)

Garbelotto, M.; Schmidt, D.J.; Harnik, T.Y. 2007. Phosphite Injections and Bark Application of Phosphite + Pentrabark Control Sudden Oak Death in Coast Live Oak. Arboriculture & Urban Forestry 33(5): 309-317. (10/07)

Giltrap, P.M.; Hughes, K.J.D.; Barton, V.C.; Hobden, E.; Barber, P.; Izzard, K. 2007. *Phytophthora ramorum* on three new hosts detected using on-site diagnostics. Plant Pathology 56, 728. DOI: 10.1111/j.1365-3059.2007.01590.x. (9/07)

Husson, C.; Delatour, C.; Frey, P.; Marçais, B.; Saurat, C.; Schenck, N. 2007. First Report of *Phytophthora ramorum* on Ornamental Plants in France. Plant Disease Vol. 91, No. 10: 1359-1359. DOI: 10.1094/PDIS-91-10-1359B. (10/07)

Jeger, Mike J.; Pautasso, Marco; Holdenrieder, Ottmar; Shaw, Mike W. 2007. Modelling disease spread and control in networks: implications for plant sciences. New Phytologist 174 (2), 279–297 DOI: 10.1111/j.1469-8137.2007.02028.x. (4/07)

Kelly, M.; Guo, Q.; Liu, D.; Shaari, D. 2007. Modeling the risk for a new invasive forest disease in the United States: an evaluation of five environmental niche models. Computers, Environment, and Urban Systems 31(6): 689-710. (3/07)

Kluza, D.A.; Vieglais, D.A.; Andreasen, J.K.; Peterson, A.T. 2007. Sudden oak death: geographic risk estimates and predictions of origins. Plant Pathology 56 (4), 580–587. DOI: 10.1111/j.1365-3059.2007.01602.x. (6/07)

Kox, L.F.F.; van Brouwershaven, I.R.; van de Vossenberg, B.T.L.H.; van den Beld, H.E.; Bonants, P.J.M.; de Gruyter, J. 2007. Diagnostic values and utility of immunological, morphological, and molecular methods for in planta detection of *Phytophthora ramorum*. Phytopathology 97:1119-1129. (9/07)

Lane, C.R.; Hobden, E.; Walker, L.; Barton, V.C.; Inman, A.J.; Hughes, K.J.D.; Swan, H.; Colyer, A.; Barker, I. 2007. Evaluation of a rapid diagnostic field test kit for identification of *Phytophthora* species, including *P. ramorum* and *P. kernoviae* at the point of inspection. Plant Pathology. DOI: 10.1111/j.1365-3059.2007.01615.x. (6/07)

Lilja, A.; Rytkönen, A.; Kokkola, M.; Parikka, P.; Hantula J. 2007. First Report of *Phytophthora ramorum* and *P. inflata* in Ornamental Rhododendrons in Finland. Plant Disease Notes Vol. 91, Number 8. Page 1055. DOI: 10.1094/PDIS-91-8-1055C. (8/07)

Linderman, R.G.; Davis, E.A. 2007. Comparative host susceptibility and sporulation potential of *Phytophthora ramorum* on species, cultivars, and hybrids of camellia. Online. Plant Health Progress DOI: 10.1094/PHP-2007-0822-02-RS. (9/07)

Linderman, R.G; Davis, E.A. 2007. Evaluation of *Phytophthora ramorum* in nursery crop tissue culture propagation. Online. Plant Health Progress DOI: 10.1094/PHP-2007-0822-01-RS. (9/07)

Linderman, R.G.; de Sá, P.B.; Davis, E.A. 2007. Comparative susceptibility of plants native to the Appalachian range of the United States to inoculation with *Phytophthora ramorum*. Online. Plant Health Progress DOI: 10.1094/PHP-2007-0917-01-RS. (10/07)

Magarey, R.D.; Fowler, G.A.; Borchert, D.M.; Sutton, T.B.; Colunga-Garcia, M.; Simpson, J.A. 2007. NAPPFAST: An Internet System for the Weather-Based Mapping of Plant Pathogens. Plant Disease Vol. 91 No. 4. DOI: 10.1094/PDIS-91-4-0336. (4/07)

Manter, D.K., Kelsey, R.G.; Karchesy, J.J. 2007. Photosynthetic declines in *Phytophthora ramorum*-infected plants develop prior to water stress and in response to exogenous application of elicitins. Phytopathology 97:850-856. (7/07)

Martin, Frank N.; Bensasson, Douda; Tyler, Brett M.; Boore, JeVrey L. 2007. Mitochondrial genome sequences and comparative genomics of *Phytophthora ramorum* and *P. sojae*. Current Genetics Vol. 51 No. 5. pp 285-296(12). DOI: 10.1007/s00294-007-0121-6. (4/07)

Meentemeyer, R.K.; Rank, N.E.; Anacker, B.L.; Rizzo, D.M.; Cushman, J.H. 2007 Influence of land-cover change on the spread of an invasive forest pathogen. Ecological Applications. In Press. (9/07)

Moralejo, E.; Muñoz, J.A. García; Descals, E. 2006. Insights into *Phytophthora ramorum* sporulation: epidemiological and evolutionary implications. *OEPP/EPPO Bulletin* 36**,** 383–388. (7/07)

Moralejo, Eduardo; Puig, Miquel; García, José A.; Descals, Enrique. 2006. Stromata, sporangiomata and chlamydosori of *Phytophthora ramorum* on inoculated Mediterranean woody plants. Mycological Research 110:1323 – 1332. Available online at www.sciencedirect.com. (3/07)

Ockels, F.S.; DiLeo, M.V.; Bonello, P. 2007. Desiccation at ambient temperature effectively preserves plant tissues infected with *Phytophthoras*. Online. Plant Health Progress DOI: 10.1094/PHP-2007-0302-01-RS. (4/07)

Ockels, Frances S.; Eyles, Alieta; McPherson, Brice A.; Wood, David L.; Pierluigi Bonello. 2007. Phenolic Chemistry of Coast Live Oak Response to *Phytophthora ramorum* Infection. J Chem Ecol 33:1721–1732. DOI: 10.1007/s10886-007-9332-z. (12/07)

Parke, J.L.; Lewis, C. 2007. Root and stem infection of rhododendron from potting medium infested with *Phytophthora ramorum*. Plant Dis. 91:1265-1270. (10/07)

Parke, J. L.; Oh, E.; Voelker, S.; Hansen, E.M.; Buckles, G.; Lachenbruch, B. 2007. *Phytophthora ramorum* colonizes tanoak xylem and is associated with reduced stem water transport. Phytopathology 97:1558-1567. (12/07)

Prospero, S.; Hansen, E.M.; Grünwald, N.J.; Winton, L.M. 2007. Population dynamics of the sudden oak death pathogen *Phytophthora ramorum* in Oregon from 2001 to 2004. Molecular Ecology. DOI: 10.1111/j.1365-294X.2007.03343.x. (7/07)

Shishkoff, N. 2007. Persistence of *Phytophthora ramorum* in soil mix and roots of nursery ornamentals. Plant Dis. 91:1245-1249. (10/07)

Shishkoff, N. 2007. Susceptibility of some *Lilac* cultivars and other members of the Oleaceae to *Phytophthora ramorum*. Online. Plant Health Progress DOI: 10.1094/PHP-2007-1101-02-RS. (12/07)

Swiecki, T.J.; Bernhardt, E.A. 2007. Influence of local California bay distribution on the risk of *Phytophthora ramorum* canker (Sudden Oak Death) in coast live oak. Available online at http://www.phytosphere.com/publications/influence_bay_dist_SOD.htm.

Tomlinson, J.A.; Barker, I.; Boonham, N. 2007. Faster, simpler, more specific methods for improved molecular detection of *Phytophthora ramorum* in the field. Appl. Environ. Microbiol. DOI: 10.1128/AEM.00161-07. (6/07)

Tooley, P.W.; Kyde, K.L. 2007. Susceptibility of some Eastern forest species to *Phytophthora ramorum.* Plant Dis. 91:435-438. DOI: 10.1094/PDIS-91-4-0435. (4/07)

Werres, S.; Wagner, S.; Brand, T.; Kaminski, K.; Seipp, D. 2007. Survival of *Phytophthora ramorum* in recirculating irrigation water and subsequent infection of *Rhododendron* and *Viburnum*. Plant Dis. 91:1034-1044. (8/07)

The following fifteen abstracts on *P. ramorum* or related topics are from the American Phytopathological Society (APS) meeting held July 28 to Aug. 1, 2007 in San Diego, CA. (8/07)

Bilodeau, Guillaume; **Lévesque, C. André; DeCock, Arthur; Hamelin, Richard. 2007.** Assessment of codon volatility as an indicator of gene polymorphisms in *Phytophthora ramorum*. Phytopathology 97:S10. (8/07)

Fichtner, Elizabeth; **Rizzo, David; Lynch, Shannon; Davidson, Jennifer; Buckles, Gerri; Parke, Jennifer. 2007.** Summer survival of *Phytophthora ramorum* in California forests. Phytopathology 97:S36. (8/07)

Goss, Erica; Press, Caroline; Grunwald, Niklaus. 2007. Selection on an avirulence homolog (Avh) gene family in *Phytophthora ramorum*, causal agent of Sudden Oak Death and Ramorum blight. Phytopathology 97:S41. (8/07)

Hodges, Amanda; **Momol, Tim; McGovern, Robert; McKellar, Mary; Hoenisch, Richard; Bates, Cassandra; Ruhl, Gail; Cain, Steve. 2007.** First Detector Education in the National Plant Diagnostic Network. Phytopathology 97:S47. (8/07)

Martin, Frank. **2007**. Mitochondrial genomics in the *Peronosporales*; implications for phylogenetics and development of molecular markers. Phytopathology 97:S71. (8/07)

McDonald, Virginia; Grunwald, Niklaus. 2007. Evaluation of infection potential and sporulation of the three clonal lineages of *Phytophthora ramorum* on two *Rhododendron* cultivars. Phytopathology 97:S73. (8/07)

McLaughlin, Inga; **Jeffers, Steven; Waldrop, Thomas. 2007**. Effects of prescribed burning on survival of *Phytophthora cinnamomi* in forest soil. Phytopathology 97:S74. (8/07)

Rooney-Latham, Suzanne; **Blomquist, Cheryl; Pastalka, Tomas; Costello, Laurence. 2007.** First Report of *Phytophthora siskiyouensis* causing disease on Italian alder in Foster City California. Phytopathology 97:S101. (8/07)

Snover-Clift, Karen; Clement, Patricia; Jensen-Tracy, Sandra. 2007. Searching for *Phytophthora ramorum*: Three years of Surveying New York State and Northeastern Nurseries for the Sudden Oak Death Pathogen. Phytopathology 97:S109. (8/07)

Uribe, Pedro; Martin, Frank. 2007. The usefulness of the COXI-COXII spacer region for the development of assays for specific detection of *Phytophthora* species. Phytopathology 97:S117. (8/07)

Wamishe, Yeshi; Jeffers, Steven; Hwang, Jaesoon. 2007. Hunting for *Phytophthora ramorum* and other species of *Phytophthora* in suburban waterways in South Carolina. Phytopathology 97:S119. (8/07)

Yakabe, Lani; Blomquist, Cheryl; Thomas, Samantha; MacDonald, James. 2007. Identification and frequency of *Phytophthora* species causing foliar diseases in California ornamental nurseries. Phytopathology 97:S126. (8/07)

Zeller, Kurt; DeVries, Renee; Levy, Laurene. 2007. Validation of Confirmatory Real-time PCR Diagnostic Assays for Detecting *Phytophthora ramorum.* Phytopathology 97:S129. (8/07)

Zeller, Kurt; Twieg, Elizabeth; Picton, Deric; DeVries, Renee; Levy, Laurene. 2007. Critical analysis of combined PCR diagnostics used in Federal Surveys for *Phytophthora ramorum.* Phytopathology 97:S129. (8/07)

Zeller, Kurt; **Twieg, Elizabeth; Picton, Deric; Negi, Sarika; Owens, Kristina; DeVries, Renee; Levy, Laurene. 2007.** A Summary of National Survey and Compliance Testing for *Phytophthora ramorum* by NPGBL – 2005-2006. Phytopathology 97:S129. (8/07)

OTHER PUBLISHED RELATED RESEARCH

Álvarez, L.A.; Pérez-Sierra, A.; García-Jiménez, J.; Javier-Alva, J. 2007. Bleeding Canker on Mesquite in Peru caused by *Phytophthora syringae*. Plant Dis. 91:226. Published online as DOI: 10.1094/PDIS-91-2-0226A. (2/07)

Balci, Y.; Balci, S.; Eggers, J.; MacDonald, W.L.; Juzwik, J.; Long, R.P.; Gottschalk, K.W. 2007. *Phytophthora* spp. associated with forest soils in eastern and north-central U.S. oak ecosystems. Plant Dis. 91:705-710. (7/07)

Beckerman, J.; Ruhl, G. 2007. *Phytophthora citricola* causes a stem canker in black walnut (*Juglans nigra*). Plant Health Progress DOI: 10.1094 /PHP-2007-0420-01-BR. Online at http://www.plantmanagementnetwork.org/update/current/. (5/07)

Göker, Markus; Voglmayr, Hermann; Riethmüller, Alexandra; Oberwinkler, Franz. 2007. How do obligate parasites evolve? A multi-gene phylogenetic analysis of downy mildews. Fungal Genetics and Biology 44:105–122. Available online. at www.sciencedirect.com. (3/07)

Greslebin, A.G.; Hansen, E.M.; Sutton, W.; Hawksworth, D.L. 2007. *Phytophthora austrocedrae* sp. nov., a new species associated with Austrocedrus chilensis mortality in Patagonia (Argentina). Mycological Research DOI:10.1016/j.mycres.2007.01.008. In press. (3/07)

Hardham, A.R. 2007. Microreview: Cell biology of plant–oomycete interactions. Cellular Microbiology 9(1), 31–39. DOI: 10.1111/j.1462-5822.2006.00833.x. (7/07)

Mrazkova, M.; Cerny, K.; Gabrielova, S.; Tomsovsky, M. 2007. First Report of Leaf Spot, Shoot Blight, and Stem and Collar Canker of *Rhododendron* spp. Caused by *Phytophthora citricola* in the Czech Republic. Disease Notes Vol. 91, No. 11: 1515. DOI: 10.1094/PDIS-91-11-1515B. (11/07)

Oh, E. and Hansen, E.M. 2007. Histopathology of infection and colonization of susceptible and resistant Port-Orford-cedar by *Phytophthora lateralis.* Phytopathology 97:684-693. (7/07)

Saavedra, A.; Hansen, E.M.; Goheen, D.J. 2007. *Phytophthora cambivora* in Oregon and its pathogenicity to *Chrysolepis chrysophylla*. Forest Pathology 37 (2007) 409–419. DOI: 10.1111/j.1439-0329.2007.00515.x. (12/07)

Schwingle, B.W.; Juzwik, J.; Eggers, J.; Moltzan, B. 2007. *Phytophthora* Species in Soils Associated with Declining and Nondeclining Oaks in Missouri Forests. Plant Disease 91:633. Published online as DOI: 10.1094/PDIS-91-5-0633A. (6/07)

Schwingle, B.W.; Smith, J.A.; Blanchette, R.A. 2007. *Phytophthora* species associated with diseased woody ornamentals in Minnesota nurseries. Plant Dis. 91:97-102. (2/07)

Shearer, B.L.; Fairman, R.G. 2007. A stem injection of phosphite protects *Banksia* species and *Eucalyptus marginata* from *Phytophthora cinnamomi* for at least four years. Australasian Plant Pathology 36:78–86. Available online at http://www.publish.csiro.au/nid/39/issue/3714.htm. (2/07)

Varela, C. Pintos; Vázquez, J.P. Mansilla; Casal, O. Aguín; Martínez, C. Rial. 2007. First Report of *Phytophthora pseudosyringae* on Chestnut Nursery Stock in Spain. Plant Disease Notes Vol. 91, No. 11: 1517. DOI: 10.1094/PDIS-91-11-1517A. (11/07)

RESEARCH

Two new *P. ramorum* A2 isolates from the EU lineage have been identified in Belgium. The finding was made as a result of a Belgian federal government research project that began in 2006 and screened all stored Belgian isolates of *P. ramorum* for their mating types.

The two isolates consistently produced oospores when mated with *P. ramorum* EU A1 isolates and not when mated with US A2 isolates or with the first EU A2 isolate. Both new isolates originated from nurseries in northern Belgium from two separate sites and from different hosts (*Rhododendron* and *Viburnum*). One isolate was from a 2002 survey, and the other from a 2003 survey. The isolates were found during a screening of 257 isolates collected between 2002 and the end of 2005. (2/07)

Research projects aimed at management of *P. ramorum* in tanoak and oak stands are underway. While recent studies have focused on disease management strategies to minimize the impacts of *P. ramorum* in susceptible oak and tanoak stands, short- and long-term data to support the efficacy of these landscape management techniques are still needed. Consequently, a project establishing a network of long-term disease management plots is being implemented to test the efficacy of these techniques. Results of this project will be used to improve disease management recommendations and will provide additional information on the epidemiology of the disease in treated and untreated stands. (2/07)

More than 250 people, representing 11 countries, 24 states, and Washington, DC, attended the March 2007 SOD Science Symposium III in Santa Rosa, CA. The 5-day conference included 65 oral presentations and 60 posters. Presentations on asymptomatic plant infections, the identification of new hosts, new findings on modes of pathogen dispersal, and pathogen presence in the wood of bole hosts, along with other important discoveries, facilitated dynamic discussions, future projects, increased collaboration, and provided new science-based information for improved regulations as well as education, early detection, management, and suppression efforts. Presentations are available on the Symposium website at http://nature.berkeley.edu/comtf/sodsymposium/index.html. (4/07)

Proposed terminology for *P. ramorum* lineages: In the Ivors *et al*. publication, "Microsatellite markers identify three lineages of *Phytophthora ramorum* in US nurseries, yet single lineages in US forest and European nursery populations," (Molecular Ecology [2006] 15, 1493–1505) numerous *P. ramorum* genotypes were identified, representing three total lineages. In light of these results, *P. ramorum* population biologists agreed that a consistent way to identify the lineages would be useful, and therefore labeled each lineage based on the continent where it was first found. Hence, the common European lineage becomes the 'EU1 lineage,' the common US/North American wildland lineage is the 'NA1 lineage,' and the recently identified new, yet rare, US/North

American lineage would be known as the 'NA2 lineage.' (To date all the NA2 isolates have been detected in nurseries.) (6/07)

Following the April *P. ramorum*-positive stream baiting sample taken from the Sammamish River in King County, WA, WSU and WSDA collaborated with USDA ARS to genotype 40 isolates sampled from 12 nurseries both within and outside the Sammamish watershed in an attempt to trace the origin of the isolate. Upon analysis, the river isolate had a unique fingerprint that matched an isolate from a landscape supplier located outside of the Sammamish watershed. While not a conclusive study, the finding does suggest the Sammamish River isolate may have been introduced from nursery stock originating from this wholesaler.

Study results to date also indicate that only the North American lineages of the pathogen (NA1 & NA2) are currently found in Washington nurseries, suggesting that previous eradication efforts of the European lineage (EU1) in WA were successful. Fifteen percent of the isolates genotyped so far have been the NA2 lineage, which is considered to be relatively uncommon. These isolates came from three nurseries sampled. One nursery had both the NA1 and NA2 lineage.

Additionally, high heterozygosity coupled with the clonal population structure observed suggests that *P. ramorum* in WA nurseries has not undergone sexual recombination. The high level of genotypic diversity at three retail nurseries and lack of sexual recombination indicates multiple introduction events at these nurseries. The nurseries at which single genotypes were detected typically had smaller sample sizes which may explain why fewer genotypes were detected. Collaborative sampling efforts continue between WSU and WSDA in an effort to gain a clearer picture of long-term genotypic diversity at single nurseries and better infer the role reintroduction versus establishment plays in the repeat detections of *P. ramorum* at nursery sites. (7/07)

The USDA FS PSW funding awards for the 2007 FY have been posted to the PSW website at http://www.fs.fed.us/psw/programs/sod/funding/awards_07.shtml. Publications and presentations supported by these funds for the first half of FY2007 have been posted to http://www.fs.fed.us/psw/programs/sod/publications.shtml. (8/07)

The Fourth Meeting of the IUFRO Working Party 7.02.09 "*Phytophthoras* in Forests & Natural Ecosystems" was held August 26 – 31 at the Asilomar Conference Center in Pacific Grove, CA. Meeting highlights included a report from Ramsfield and others that *Phytophthora kernoviae* was first recorded in New Zealand (as *Phytophthora* sp.) in the 1950s; Renaud Ioos' analysis of nuclear and mitochondrial genes to revise the origin of the interspecific hybrid *P. alni*; and a poster on the production of viable oospores by *P. ramorum* in a laboratory in Belgium. The presentation and poster abstracts are available on the "Programme" page of the conference website at http://nature.berkeley.edu/IUFRO2007/phytophthora/programme.html. (9/07)

RELATED RESEARCH

During the course of the past three years, a new needle disease has appeared in *Pinus radiata* plantations, chiefly in the Arauco province of Chile. The disease, locally referred to as Daño Foliar del Pino (DFP), is typified by the relatively rapid death of needles and subsequent defoliation of trees. Infections usually begin to appear in late autumn and coincide with the onset of rain. Infected needles typically display distinct resinous bands on their laminas. Where infections reach the needle bases, copious amounts of resin exude from the points of attachment with the stems and dead needles falling from the trees. New needle growth in the following season is typically not affected and trees appear to recover unless a new season of infection occurs the following year. Newly planted seedlings and naturally regenerated plants die in the first year of growth. Isolations from infected *P. radiata* needles using selective media have consistently yielded a Phytophthora sp., the identification of which has been confirmed based on morphological characteristics including non-papillate and caducous sporangia. DNA sequence analyses for the ITS region of the rDNA and COX II region of isolates have confirmed the identification of the fungus from infected *P. radiata* needles as a Phytophthora sp. Furthermore, they have provided robust evidence to suggest that it represents a new species, *Phytophthora pinifolia* nom. prov. (11/07)

***Phytophthora alni* subsp. *uniformis* (PAU) has been found in Alaska during riparian** *Phytophthora* surveys. This is not the highly pathogenic *P. alni* subsp. *alni* (PAA) found in Europe killing alder. PAU is thought to have hybridized with *P. alni* subsp. *multiformis* to form the highly pathogenic PAA. The Alaskan *P. alni* subsp. *uniformis* findings were made in two remote, unmanaged locations hundreds of miles from one another. To date, no collar or root symptoms of *P. alni* have been identified with the findings, and inspections for other symptoms of *Phytophthora* disease have been negative. While not completely understood, it is thought that PAU may benignly co-exist with alder in Alaska and has not previously been noted due to the lack of surveys such as those conducted in 2007. PAU is the only variant of *P. alni* found in Alaska to date. This is the first finding of any of the *P. alni* variants in North America.

The North American Forestry Commission has noted that *P. alni,* especially PAA, poses significant phytosanitary concerns for those countries where the pathogen does not yet occur. Due to the extensive stands of alder across North America and the presumption that PAA does not presently occur in the United States, the introduction of this pathogen has been considered highly undesirable. (12/07)

NEW HOSTS

The UK has found *Schima wallichii* (Chinese guger tree) infected with *P. ramorum*. The symptomatic foliar samples were taken outdoors from a historic garden near Cornwall in 2006. *P. ramorum* has been found on numerous hosts at the garden since 2003, including *Rhododendron* species, *Pieris, Kalmia latifolia, Magnolia, Camellia* and *Viburnum*. (2/07)

***Arctostaphylos uva-ursi* (Kinnikinnik), *Prunus laurocerasus* 'Nana' (Dwarf English** Laurel), and *Osmanthus delavayi* (Delavay Osmanthus) nursery stock have been found *P.*

ramorum-positive in King County WA. As Koch's postulates have not been completed, all three species will be added to the "APHIS List of Regulated Hosts and Plants Associated with *Phytophthora ramorum*" as associated plants, and regulated only as nursery stock.

Symptomatic *Arctostaphylos uva-ursi* was collected in a nursery in King County. The nursery, previously found positive in 2005, is approximately 85% wholesale and did ship out of state under their Federal Order Certification. The positive host was discovered in a plastic hoop-house on a ground cloth with no gravel underneath. The hoop-house was the site of recent previous positive hosts *Rhododendron* 'Unique' and *Viburnum tinus*. All three positive hosts were purchased from other nurseries. The soil was saturated by overhead irrigation combined with excessive rain. The site has a very high water table. Due to heavy rain in November, the house flooded leaving sediment on pots and plants.

Symptomatic *Prunus laurocerasus* 'Nana' nursery stock was collected in a nursery in King County. The nursery, also found to have *P. ramorum*-positive plants in 2005, does not ship out of state. The positive containerized *Prunus laurocerasus* 'Nana' was on gravel with no plastic or other ground cloth underneath and was in an area with overhead irrigation. This host was onsite for at least a year prior to *P. ramorum* detection. Symptoms include tip dieback, browning on leaf margins and veins.

Symptomatic *Osmanthus delavayi* was collected in a nursery in King County. The nursery was also found positive in 2005 and does not ship out of state. The positive *Osmanthus delavayi* was found inside a plastic hoop-house on a ground cloth with gravel underneath and in an area with overhead irrigation. Symptoms included tip dieback and V-shaped lesions at base of petioles. (2/07)

Oregon Grape (*Mahonia aquifolium* [Pursh] *Nutt.* - Berberidaceae Family) was found *P. ramorum*-positive for the first time at a Canadian nursery. Symptoms found on the Oregon Grape were primarily foliar, and included leaf spots and discoloration. Various cultivars of this plant are available in the nursery trade. This host species is native to the West Coast of the US. (8/07)

Silk tassel bush (*Garrya elliptica*) was found *P. ramorum*-positive for the first time in the UK. Sixteen plants were identified as infected with the pathogen in 2/07. Upon confirmation, a quarantine was imposed and the plants were destroyed. This host species is a West Coast US native. (8/07)

REGULATIONS

The Tiffany Creek Preserve in Nassau County, NY has been officially confirmed *P.* *ramorum*-free. The one PCR *P. ramorum*-positive red oak forest find was made at the Preserve in 2005. Despite numerous follow-up official samples and laboratory analysis, officials never were able to recover the pathogen from the tree, nor the surrounding area. To assure absence of the pathogen in the Preserve, sampling and testing continued through fall 2006. With all findings remaining negative, the area is now officially considered *P. ramorum*-free and will no longer fall under regulatory scrutiny. (2/07)

The new USDA APHIS *P. ramorum* regulation *"Phytophthora ramorum;* Quarantine and Regulations" was published February 27, 2007 in the Federal Register. This rule primarily codifies the Federal Order issued in December 2004 that established restrictions on the interstate movement of nursery stock from nurseries in nonquarantined areas in California, Oregon, and Washington. The rule also incorporates all updates issued since the original APHIS regulation was published in 2002. (3/07)

Due to recent discoveries of new *P. ramorum* infection centers in Curry County, OR, ODA has increased the size of the quarantine area to 24.25 sq. mi. There are now three areas under quarantine; two small areas that are 1 sq. mi. each in size and the original area that has increased to 22.25 sq. mi. Eradication efforts are ongoing in all three quarantine areas. In addition, ODA updated the state quarantine and nursery certification rules to reflect changes in the official host list and in federally mandated protocols. (4/07)

The EU published a new Decision on *P. ramorum* in March. Changes to the regulation include: updates to the host list; requiring an additional inspection of production nurseries each year; destruction of associated growing media and plant debris (when destroying infected plants and all susceptible plants within a 2 m radius of confirmed infected plants); and assuring that appropriate phytosanitary measures have been taken on growing surfaces within a 2 m radius of infected plants. (4/07)

APHIS has updated the "Official Regulatory Protocol for Wholesale and Production Nurseries Containing Plants Infected with *Phytophthora ramorum*." The revised CNP, Version 8.0 is to be used by any nursery found positive for *P. ramorum*. This revised protocol differs most markedly in that it contains additional measures such as biosecurity procedures for nurseries which have been confirmed positive within a year of being found previously positive and then released from emergency measures. (6/07)

The USDA APHIS Nursery Survey Protocol has been updated. The new protocol can be found at http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/downloads/surveyplan/surveymanual.pdf. (7/07)

USDA APHIS has revised the "Update on PPQ Diagnostics for SOD: Diagnostics procedures approved b y APHIS and diagnostic analyses performed by APHIS PPQ for *Phytophthora ramorum.*" Revisions to the "Culture/Morphology Protocol," "Nested PCR Protocol," and "Real Time PCR Protocol" have also been made. (7/07)

Rhododendrons planted along a residential roadway were found *P. ramorum* positive in Thurston County, WA. WSDA has implemented the landscape protocol; all rhododendrons along the roadway have been destroyed. The positive plants were provided to the landscaper from an out-of state West Coast nursery. (8/07)

Changes in *P. ramorum* Diagnostics Responsibilities - Final morphological identifications for foreign and domestic plant pest interceptions are the responsibility of

APHIS PPQ NIS. This staff coordinates final identifications carried out by specialists in NIS, ARS, and cooperating laboratories. Previously, molecular and biochemical diagnostics were performed by CPHST, National Plant Germplasm Quarantine Biotechnology Laboratory in Beltsville Maryland. However, in July 2007 the newly formed NIS Molecular Diagnostic Lab was charged with molecular and biochemical diagnostics of quarantine pests for which there are PPQ approved tests, including *P. ramorum*, soybean rust, plum pox virus, citrus canker, and others. This freed CPHST from these responsibilities so that, among other work, they can continue to validate diagnostic methods. Responsibility for morphological and molecular diagnostics of *P. ramorum* and other program pests within NIS at one location will provide a centralized diagnostics and communications structure. (8/07)

Effective September 7, 2007, *Garrya elliptica* and *Mahonia aquifolium* will be regulated by USDA APHIS for *P. ramorum*. Nurseries operating under a compliance agreement may continue to ship hosts and associated plants, including the newly listed plants. However, all other nurseries containing these newly listed plants must be properly inspected, sampled, tested, and placed under a Compliance Agreement by September 7, 2007 in order to be able to move regulated plants interstate. (9/07)

Changes to EU legislation on *P. ramorum* were introduced on 3/27/07. The Decision amends the list of plants, wood and bark susceptible to *P. ramorum*, increases from one to two the number of official inspections of specific species of susceptible plants in places of production and extends eradication measures to cover growing media and plant debris as well as sanitizing the surface upon which infected plants have been standing. (10/07)

ODA has published a notice to amend the State quarantine for *P. ramorum* and the regulated area for nursery stock. The proposed amendments would harmonize the State's *P. ramorum* rules with current federal regulations and protocols. The area under quarantine for *P. ramorum* in Curry County would increase to 166 square miles, and include five newly detected sites outside of the existing quarantine area. (11/07)

NURSERIES

Three *P. ramorum* isolates from a nursery in Humboldt County, CA were determined to be of the European *P. ramorum* lineage. This is the first time the European *P. ramorum* strain has been confirmed in CA. CDFA was notified of this find in early March as part of a genetic study of *P. ramorum*, including several isolates from CDFA's Plant Pest Diagnostics Center that were sent to the USDA ARS lab in Corvallis, OR for genotyping.

The European isolate confirmations were originally taken from a Humboldt County retail nursery where samples were collected in the spring of 2006. The nursery is strictly a retail facility, is not under a *P. ramorum* compliance agreement, and does not ship interstate or out of the quarantined counties.

After notification of the European isolate confirmation, the Humboldt County Agricultural Commissioner's office conducted an extensive inspection of both the nursery and its perimeter in early March 2007. Two nursery samples collected during this follow-up inspection were confirmed positive for *P. ramorum* and have been sent to the USDA for genotyping. An extensive trace-back list was provided by the nursery for all suppliers of plants to this nursery between 2002 and 2007. This list has been forwarded to the USDA for trace-back investigations.

The nursery is very conscientious and proactive, and voluntarily implemented BMPs at the time they were determined positive in 2006 (before the European lineage determination was made). Additionally, they began working with UC Davis researchers to determine positive soil areas and the best method of treatment. The nursery is continuing to voluntarily go beyond what is required in the state and federal regulations. (4/07)

To date in 2007, WA has had three *P. ramorum* positive nursery confirmations. The first two positive nurseries were found in King and Snohomish counties, and were discovered as the result of the new trace-back protocol. The third *P. ramorum*-positive nursery was in Cowlitz County (near the Oregon border) and was discovered as the result of a Compliance Certification Inspection for host and associated host interstate shippers. (4/07)

A Hinds County, Mississippi nursery was found to have a *P. ramorum*-positive *Camellia* sp. March 23, 2007. Consequently, the nursery is under an emergency action notification and is currently being delimited. The inspection was a follow-up inspection to the eradication performed last year. (4/07)

A retail nursery in Tallahassee, Florida was found *P. ramorum*-positive in January 2007. The nursery was also found positive in 2006. The confirmations were made on three cultivars of *Camellia japonica*. (5/07)

California had four new *P. ramorum*-positive nurseries identified in April, bringing the total number of 2007 nursery confirmations for the state to five. Three of the identified nurseries were retail facilities in quarantined counties found during nursery stock cleanliness inspections. None of the three retailers are under compliance or ship out of the quarantined counties. Two of the three sites have been positive for *P. ramorum* before. The fourth *P. ramorum*-positive confirmation was made on *Loropetalum chinense* at a production nursery during their annual compliance agreement inspection. The nursery is under compliance and ships out of state (to NV only). This nursery was also found *P. ramorum* positive in April of 2006. (5/07)

ODA has completed approximately 15% of its *P. ramorum* annual certification inspections for the year. So far, *P. ramorum* has been found at two production nurseries. One nursery in Washington County was confirmed to have an infected block of *Camellia* and an infected block of *Rhododendron*. The second nursery, located in Clackamas County, had a *P. ramorum*-positive *C. sasanqua* 'Yuletide' plant. (5/07)

In states outside the regulated and quarantine area, *P. ramorum* nursery surveys for 2007 are a part of the 2007 CAPS program. Currently 18 states have signed agreements to conduct voluntary surveys in 2007. Data from these surveys will be entered into the National Agricultural Pest Information System database. (5/07)

The first US findings of *P. ramorum*-positive Loropetalum have been found at a Sacramento County, CA nursery that has previously been identified with the pathogen. Symptoms, unlike other foliar hosts, can include large and small pin-prick size lesions on the underside of leaves, surrounded by red rings. (6/07)

CA had two *P. ramorum*-positive nurseries identified in June. The first was a San Diego County production nursery found positive for *Pieris japonica* 'Amamiana.' This facility is under compliance for *P. ramorum* and does ship interstate. Trace-forward investigations are underway, and include nurseries in seven western states and 10 CA counties. The second confirmation was made at an Alameda County production nursery. The positive *Magnolia grandiflora* was detected during their annual compliance agreement inspection. The nursery is under compliance for *P. ramorum* and does not ship interstate. (7/07)

Nursery industry representatives met with NPB, USDA ARS, and USDA APHIS representatives in May to discuss draft industry-developed BMPs. Suggested changes to the document have been sent back to the Industry BMP working group for review and action. A Steering Committee and a Funding Sub-Committee were also formed at the meeting. Committee members include representatives from CA, OR, WA, and GA Nursery Industries; CA, OR, and WA State Departments of Agriculture; USDA APHIS, ARS, and CSREES; the ANLA/HRI; and the NPB. The Steering Committee was created to help develop a voluntary Pilot BMP program for a sampling of nursery operations within the participating states, and the Funding Sub-Committee was created to identify funding sources to support the Pilot program. States participating in the program have been charged with submitting their budget proposal to the Steering Committee. (7/07)

All interstate shipping OR nurseries that grow *P. ramorum* host or associated plants are currently certified as required by the USDA interim rule. ODA has completed 74% of its annual nursery certification inspections for the year. It is anticipated that all of the 493 required 2007 inspections will be complete by mid-October as well as at least one supplemental (high-risk) inspection at 201 nurseries that grow *Camellia* and *Rhododendron*. Eighty supplemental high-risk inspections have been completed so far this year. Only two Oregon nurseries have been found with *P. ramorum* so far this year. No new infested nurseries have been found since May. (8/07)

A wholesale nursery in Pitt Meadows, British Columbia is in the process of destroying all of its plants on site in an effort to rid the property of *P. ramorum*. The nursery has been found positive for the pathogen several times since it was first identified there more than a year ago. Since the initial confirmation, the nursery has been under quarantine and unable to sell any plant species for most of that time. Following disposal of all plant material, infected soil and production areas will be disinfected. CFIA will sample soil after the eradication process. If the results prove negative, follow-up samples

will be taken after two months. If those samples are also negative, the nursery will be allowed to resume normal operations. To date, the disease has not been detected in the soil of surrounding properties or in local blueberry crops. The only other BC nursery with a persistent infection is a much smaller property on the Sunshine Coast. Disposal actions are also underway on that site, including the use of controlled burns and deep-burial of affected material. (8/07)

Mock Nursery Update: After a year of negotiations to secure a mock nursery site for *P. ramorum* research at an Alameda County facility, it appears that the site is likely no longer an option. While the County decision is not yet final, bids are being accepted from others looking to develop the site. Therefore, alternate locations for the mock nursery are being sought after for consideration. Location criteria include: five to 10 acres in a quarantined county, a secure site with accessible power and water, no oak forests or nurseries in close proximity, preferably no native hosts such as tanoak and bay nearby, and the ability to collect drainage from the projects. (11/07)

In alignment with the NPB High-Risk Proposal, CA nursery inspectors are now conducting two inspections per year on "medium-risk" plants and three inspections per year on "high-risk" plants. High-risk (HR) plants (*Camellia* and *Rhododendron*) have been defined as such because of the higher frequency with which these genera are found *P. ramorum* positive compared to other genera. Medium-risk plants include *Viburnum*, *Pieris*, and *Kalmia*. *Viburnum* and *Pieris* are the next most frequently found genera after the HR plants. Kalmia is considered medium risk because it is a reasonably good *P. ramorum* host and it is widespread in eastern US forests. With an ever-expanding host list and decreasing resources, inspections are increasingly focused on those plants at greatest risk for *P. ramorum*. (11/07)

As of October 3, 2007, there have been a total of 21 positive nursery finds this year nationwide. The states with positive finds/detections are CA(7), OR(2), WA(7), FL(1), GA(3), and MS(1). Of the 7 positive CA nurseries identified this year, 1 was a repeat confirmation producer, 3 were repeat confirmation retailers, 2 were producers (not repeats), and 1 was a retailer (not repeat). (12/07)

MANAGEMENT

Warm spring rains in 2005 and 2006 brought *P. ramorum* sporeloads to a new high in Marin County, causing scores of new oak and tanoak infections. According to Marin Municipal Water District personnel, tanoak mortality is now greater than during the initial SOD outbreak of 1999-2001. In response to increased disease levels in the County, key Marin County agencies met in April 2007 to share observations and discuss future plans; Fire Safe Marin released the "Marin on Fire: Preparing for the Next Urban Wildfire" video; the Public Works Department began removing hazardous trees in west Marin; and various departments began alerting the Marin County Board of Supervisors to the need for funding for additional hazard tree removals. Consequently, County Supervisor Judy Arnold is now reaching out to Sacramento lawmakers for assistance in dealing with the hazard tree removals in the County, and Agricultural Commissioner

Stacy Carlsen is seeking support from fellow county Agricultural Commissioners impacted by *P. ramorum*.

Concerns among landowners and homeowners throughout the County are also increasing, with Mill Valley and Novato residents requesting information on the disease and how they can prevent it, and ranchers in Chileno Valley (NE Marin) asking for technical assistance as more of their oaks appear to be infected. Responding to Mill Valley needs, County Supervisor Charles McGlashan, UCCE Marin, and the COMTF held a community meeting in September, which drew close to 50 homeowners hoping to learn more about managing SOD on their property. UCCE Marin Environmental Horticultural Advisor Steven Swain will continue this management message in 2008 with Forest Stewardship workshops that incorporate SOD into a larger framework of maintaining forest health. (10/07)

In Humboldt County, 2007 spore trapping and soil sampling in known infested areas detected very little *P. ramorum* inoculum. Nor was the same suite of foliar symptoms (blackened petioles and shepherd's crooking of tanoak, and large-scale branch-tip dieback in huckleberry, manzanita, and blueblossom) apparent after the dry winter of 2006-2007 as was apparent after the previous, very wet winter. Existing *P. ramorum* infestations, however, continued to fill in with new tanoak mortality. This mortality is speculated to have mostly originated from infections initiated in 2005-2006.

Although dramatic expansions of the infested area were not evident from the ground, the USDA FS PSW FHP aerial survey mapped several new large polygons of mortality along the Salmon Creek watershed north of the Redway area, roughly parallel to the South Fork Eel River. Additionally, the aerial survey mapped a polygon of tanoak mortality at Eel Rock on the main stem Eel River to the east of the known infested area, which was subsequently confirmed to be caused by *P. ramorum*. The survey also identified two polygons of mortality in the East Branch South Fork Eel to the southeast of Garberville, a watershed in which *P. ramorum* inoculum had previously been detected but where no infected trees had so far been identified. This infestation is approximately three miles from previously known infested areas near the Garberville airport.

In March, California State Parks and UCCE Humboldt-Del Norte supervised removal of all California bay laurel trees along a 3.5-mile stretch between the Avenue of the Giants and the South Fork Eel and between Myers Flat and Burlington. UCCE periodically samples bay trees along the Avenue of the Giants and the South Fork Eel to determine *P. ramorum* movement north along the river corridor. The removal included both known infected and unsampled trees. This stretch represented the farthest known extent of the *P. ramorum* infestation to the north in the county and has not yet experienced any *P. ramorum*-caused tanoak mortality. Periodic sampling along the Avenue will continue, along with similar roadside sampling currently in progress on all sides of the county's known infestation. (11/07)

Sonoma County SOD-related tanoak and coast live oak mortality has dramatically increased over the last two years, with 23% of the County's at risk forests currently infested. Of the 75,000 acres impacted by SOD, 39% is new die-off mapped in 2007. Focusing on disease biology, spread, and treatment, as well as potential fire hazards associated with SOD mortality, Sonoma's two SOD Program coordinators facilitated 21 community meetings, reaching over 900 residents in the past year. Media coverage has also been extensive with 14 local print and radio stories since March 2007. Additionally, SOD funding issues have been incorporated into the Sonoma County 2008 Legislative Program, meaning the County will support SOD funding legislation at the state level.

In early January 2008, the coordinators will present an SOD Strategic Response Plan to the County Board of Supervisors. This plan presents the current and possible future impacts of SOD on land management agencies within the County and lists estimated costs of mitigation activities over the next few years. Funding needs for the first year are estimated at $3.3 million: $2 million for fire fuel mitigation activities and $1.3 million for tree removals and treatment, education and outreach, developing a hardwood fuel model, mapping the infestation, and funds for fire departments. The strategic plan is intended to bring attention to the increase in pathogen spread, the expense of removing hazard trees, and the potential for increased fire risks associated with heavy mortality.

Fire Safe Sonoma's "Sudden Oak Death Mitigation and Defensible Space Project," funded by a grant from the BLM, has recently gotten underway and will be active until May 2008. Funds will be used to help homeowners in SOD-impacted areas with costs related to creating or maintaining 100 feet of defensible space. Fire Safe Sonoma anticipates that the program will remove a tremendous amount of fire fuels as well as provide a model for administration of SOD tree mitigation funds. (12/07)

OTHER ISSUES OF INTEREST

Laurel wilt is a deadly disease of redbay (*Persea borbonia*) and other tree species in the Laurel family (Lauraceae). The disease is caused by a previously unknown, and still-not-named fungal pathogen (*Raffaelea* sp.) that is being introduced into host trees by the non-native redbay ambrosia beetle *(Xyleborus glabratus*). The fungus plugs the water-conducting cells of an affected tree and causes it to wilt. Laurel wilt has caused widespread and severe levels of redbay mortality in the Southeastern coastal areas of South Carolina, Georgia, and Florida. Dying sassafras and a rare spicebush have also been found infected with the fungus. For more information, go to http://www.fs.fed.us/r8/foresthealth/laurelwilt/index.shtml. (3/07) and (8/07)

The Republic of Korea officially added *Phytophthora nemorosa* to its list of quarantine pests on July 13, 2007. Korea is the first country to regulate for this pathogen. (8/07)

USDA APHIS published a proposed rule August 28, 2007 to update the list of select agents, which includes the addition of *P. kernoviae*. Select agents are defined as pathogens or biological toxins which have been declared by the US Department of Health and Human Services or by the USDA to have the "potential to pose a severe threat to

public health and safety." Administered by the CDC, the Select Agent Program regulates the laboratories which may possess, use, or transfer select agents within the US. If approved, this will be the first US regulation for *P. kernoviae*. (9/07)

While heavy infestations of California oak worm (*Phryganidia californica*) have been observed in coastal areas of Santa Cruz and Monterey Counties as well as the San Francisco Bay Area this year, it is important to note that healthy and well-cared for oaks tolerate extensive defoliation without serious harm. Infestations can be identified by the larvae hanging from silk-like threads throughout the canopy as well as the accumulation of frass on the ground below the canopy.

In many cases this year, the first generation larvae (this past spring) were so heavy that widespread defoliation of live oaks were observed in the summer, resulting in entire woodlands of leaf-less live oaks in some areas. The second generation larvae emerged this past summer, but in many cases there was little foliage available for them to eat. Consequently, the larvae began to migrate from trees in search of food. Since the host range of these larvae is limited to oak, they will eventually die if they do not find oak leaves to eat. Sometimes they can be found eating other hosts in a futile attempt to get nutrition, but they do not feed for long, and will subsequently die. (10/07)

FUNDING AND LEGISLATION

The USDA FS PSW Research Station will not issue an SOD RFP in 2007. With more than 40 active research projects still underway as a result of the 2004, 2005, and 2006 RFP process, most available research funds are committed through the 2007 federal fiscal year. (3/07)

An RFP for research on biological invasions of non-native species in Northeastern and Midwestern forests has been issued by the USDA FS Northern Research Station, Disturbance Ecology and Management of Oak-Dominated Forests Research Work Unit. Non-native pest insects, pathogens, and plants that result in serious or potentially serious economic or ecological effects, including *Phytophthora* spp. (Sudden Oak Death-related) are in the scope of the RFP. A total of $150,000 is available for the 2007 fiscal year pending final Congressional budgetary action. (3/07)

Fire Safe Sonoma has been awarded a grant through the CA Fire Safe Council Grant Clearinghouse with funding from the BLM. The approximately $150,000 grant provides funds for homeowners to help defray the costs of removing SOD-affected hazardous trees. Homeowner groups are also eligible to receive financial support for chipping activities to help minimize infested debris. The funding runs for 18 months starting October 2007. (5/07)

Canada has set aside more than $24 million in *P. ramorum* compensation funds for wholesale and retail nurseries as well as individuals impacted by pathogen eradication efforts. Compensation ranges from $4 for young plants to $300 for the largest trees. Affected parties can also claim costs incurred in the disposal and treatment of plants and related materials, either via incineration or deep burial. The program will run through the

end of 2008, at which point the government will consider whether to extend it. The compensation provided in these Regulations complements financial assistance through the Canadian Agriculture Income Stabilization (CAIS) Program to producers. (8/07)

The USDA FS SPF FHP program has issued their 2008 *P. ramorum* RFP. Approximately $600,000 is expected to be available for 2008. Proposals should focus on *P. ramorum* monitoring and management efforts, including activities such as detection, outreach, and containment. Multi-year, collaborative projects are encouraged and should range from $5,000 and $100,000 per year. (12/07)

RESOURCES

Hardcopies of the "Proceedings of the Sudden Oak Death Second Science Symposium: The State of Our Knowledge" are now available from the USDA FS PSW Research Station. The Proceedings are also available on line at http://www.fs.fed.us/psw/publications/documents/psw_gtr196/. (2/07)

Kliejunas, John T. 2007. Sudden Oak Death and *Phytophthora ramorum*: A Summary of the Literature. Chapter 5. Management and Control. Draft, February 22, 2007, Albany, California. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 42 pages.

The first available chapter of this comprehensive document on research findings and management activities of SOD and *P. ramorum* has been posted to the COMTF website at http://nature.berkeley.edu/comtf/html/sod_literature_summary.html. Topics covered will include background; identification and distribution; the disease cycle; epidemiology and modeling; management and control; and environmental and socio-economic impacts. (3/07)

The California Tree Failure Report Program (CTFRP) is seeking reports of tree failures related to SOD and other causes. The CTFRP was established in 1987 to collect quantitative information on the mechanical failure of trees (trunk breaks, branch breaks, and uprootings). This information is used to develop "failure profiles" for genera and species to more accurately assess failure probability in standing trees and thereby help to recognize hazardous trees before they fail. Failures of *Quercus* species account for 21% of all the submitted reports in the CA database. CTFRP data has also been migrated into the newer Internet-based International Tree Failure Database which began in 2004. (3/07)

The Nature Conservancy has posted "An Ounce of Prevention: How to Stop Invasive Insects and Diseases from Devastating U.S. Forests" to their website. In this report, the Nature Conservancy highlights the role of imported nursery stock in the accidental introduction of invasive species to the US. To respond to trade issues and invasive species challenges, the Conservancy suggests the use of a 5-point implementation plan for a temporary holding category, called "Not Approved Pending Pest Risk Assessment." (3/07)

The concept paper "Recommendation of a Pathway Approach for Regulation of Plants for Planting," has been issued by the new IUFRO 'Alien Invasive Species and International Trade' Unit. The paper endorses a pathway approach to provide the scientific background and advice for regulators concerned with preventing movement of pests with live plants. The authors suggest that the current pest-based regulatory approach does little to hinder the introduction of pests not yet known to science, and suggests that a pathway approach to regulating nursery stock, in conjunction with best management practices that are effective at preventing known pests, will significantly reduce the risk of introducing unknown pests. (3/07)

USDA APHIS has changed their web address for *P. ramorum*. The new address is http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/index.shtml. (4/07)

The Proceedings from the 3rd IUFRO *Phytophthoras* in Forests and Natural Ecosystems meeting are now available. Copies may be purchased for £ 22 ($43 US) by contacting Claire Sabin at claire.sabin@forestry.gsi.gov.uk. (4/07)

The Bay Area Public Broadcasting TV station KQED featured "Plant Plague: Sudden Oak Death" on their QUEST program in April. The entire segment, along with additional pictures, a blog for comments and questions, educator resources, and important links for further information, can be found on the Quest website at http://www.kqed.org/quest/television/view/250. (5/07)

Chapter 1 of "Sudden Oak Death and *Phytophthora ramorum*: A Summary of the Literature" book has been posted to the COMTF website. Chapter 1 provides introductory and background information on SOD and *P. ramorum.* (5/07)

The Sudden Oak Death Science Symposium III website has been updated to include slideshow, poster, and audio files from the conference. Click on the "Schedule of Events" link to see the full program with all relevant links. For the complete audio-visual experience, open the slideshow PDF and audio mp3 files and page through as you listen to the corresponding narration. (5/07)

The American Phytopathological Society's May APSnet Feature, "Why are *Phytophthora* and other Oomycota not true Fungi?" can be found at http://www.apsnet.org/online/feature/oomycetes/. The article covers the characteristics of true Fungi and why Oomycota are grouped with some algae as part of either the Chromista or Straminipila kingdoms. (6/07)

Western Australia's regional branch of the Australasian Plant Pathology Society is featuring *P. ramorum* online in June as the "Pathogen of the Month." Recent inoculation trials of Australian plants in California and Europe, as well as current climatic risk models, indicate that *P. ramorum* poses a significant biosecurity threat to the Australasian region. The susceptibility and sporulation potential of native Australian plant species is currently being investigated, as well as modeling the climatic suitability of Australian regions for *P. ramorum*. (6/07)

WSU is excited to announce the posting of a "Virtual Oomycete Demonstration Nursery" where clients can tour a generic nursery and get ideas on how to improve management strategies for *Phytophthora* and *Pythium* at their particular nursery site. (7/07)

A *P. ramorum* Multilocus Genotyping Database is now available at: http://oregonstate.edu/~grunwaln/index.htm. Developed by the USDA ARS laboratory at OSU, the searchable database is intended to provide timely information on new isolate detections in an effort to facilitate the identification of migration pathways. Host plant species, detection location and date, lineage, mating type, and other relevant information is now available for hundreds of *P. ramorum* isolates from nurseries throughout the US. (8/07)

An updated "Understanding *Phytophthora ramorum* Key Findings from UK Research" pamphlet has been posted to the DEFRA website. Information covered includes susceptible host species found in the UK, disease development, spore production and spread, pathogen survival, and control and management of the disease in the UK. (9/07)

ODA, along with OAN and OSU Extension Service, is poised to begin implementing the "Best Management Practices for Nurseries Pilot Project" within the next few months. ODA received a grant from the USDA Natural Resources Conservation Service (NRCS) to help build the infrastructure needed to audit effectiveness of the best management practices within participating nurseries. To meet the requirements of the USDA NRCS grant, particular emphasis will be placed on management of *Phytophthora* species in irrigation water, soil, and potting media. To date, seven nurseries have agreed to participate in the pilot project. ODA plans to include another 18 nurseries in the effort. (10/07)

"Vivero de Demostración Virtual Oomycete," a Spanish version of the "Virtual Oomycete Demonstration Nursery," has been posted to the Washington State University Puyallup education resource website at http://www.puyallup.wsu.edu/ppo/resources.html. (10/07)

Presentations and posters from the 4th IUFRO *Phytophthoras* in Forests and Natural Ecosystems Conference at the Asilomar in Pacific Grove, CA are available at http://nature.berkeley.edu/IUFRO2007/phytophthora/programme.html. (11/07)

OUTREACH ACTIVITIES

3/5 -3/9 –SOD Science Symposium III; Hyatt Vineyard Creek Hotel and Spa; Santa Rosa, CA

4/21 - Sonoma County Community SOD Workshop; Guerneville, CA

4/24 – SOD/*P. ramorum* Wildland Training Session; Pt. Reyes National Seashore; Pt. Reyes Station, CA

5/1 – SOD/*P. ramorum* Wildland Training Session; Presentation Center; Los Gatos, CA

5/6 – Third Annual Bringing Back the Natives Garden Tour; The self-guided tour showcases 60 pesticide-free, water-conserving East Bay gardens that provide habitat for wildlife and contain 30% or more native plants. Sudden Oak Death presentations and materials available at select gardens throughout the day

8/18 – Occidental Sudden Oak Death Community Meeting; Occidental Fire Station; Occidental, CA

9/12 – Los Altos Hills SOD Community Meeting; Los Altos Hills, CA

10/20 - Santa Rosa Sudden Oak Death Community Informational Meeting; Finley Community Center; Santa Rosa, CA

10/20 – Woodside Homeowner Agri-Fos® Treatment Training; Mounted Patrol Grounds; Woodside, CA

10/25 – Hillsborough Sudden Oak Death Community Informational Meeting; Hillsborough Town Hall; Hillsborough, CA

10/29 – Fresno County *P. ramorum* Nursery Industry Training for Professionals; Veterans' Memorial Building; Clovis, CA

11/06 – Ventura County *P. ramorum* Nursery Industry Training for Professionals; Government Center; Ventura, CA

11/13 – San Diego County *P. ramorum* Nursery Industry Training for Professionals**;** Escondido Farm Bureau; Escondido, CA

11/14 – Orange County *P. ramorum* Nursery Industry Training for Professionals; South Coast Research and Extension Center; Irvine, CA

11/15 – Sacramento County *P. ramorum* Nursery Industry Training for Professionals; Ag Extension Auditorium; Sacramento, CA

11/15 – Green Valley Sudden Oak Death Community Informational Meeting; Falls School Multipurpose Room; Fairfield, CA

12/12 – Sudden Oak Death Professional Treatment Training Workshop; Huddart County Park; Woodside, CA

PERSONNEL CHANGES

Caerleon Safford has been hired as an SOD coordinator for Sonoma County as part of a USDA FS FHP grant to address increased SOD fire hazards as well as other SOD-

related issues in Sonoma County. Caerleon works with the Sonoma County Department of Emergency Services in Vegetation Management and Fire Prevention Education. She also is the Executive Coordinator for Fire Safe Sonoma and is currently working on a Community Wildfire Protection Plan for Sonoma County. She can be reached at (707) 206-5467 or csafford@mcn.org. (2/07)

Steven Swain will be leaving his position with the Garbelotto lab at UC Berkeley in February, and is taking a position with Marin and Sonoma Counties as the Environmental Horticulture Advisor (formerly Pavel Svihra's position). He can be reached at (415) 499-4204 in late February. (2/07)

Russ Bulluck left his position as National Program Staff Scientist with USDA APHIS to take a Plant Pathologist position with USDA APHIS PPQ Emergency and Domestic Programs. As part of the Emergency Planning and Preparedness staff, his responsibilities include developing New Pest Response Guidelines for exotic plant pathogens. Russ can still be reached at (919) 855-7646 or via email at Russ.Bulluck@aphis.usda.gov. (4/07)

Walter Gutierrez has replaced Russ Bullock as the USDA APHIS National Program Staff Scientist working on *P. ramorum*. He can be reached in Raleigh, North Carolina at (919) 855-7529 or via email at Walter.A.Gutierrez@aphis.usda.gov. (4/07)

Amy Jirka is no longer a Forestry Research Associate at Cal Poly, San Luis Obispo. In early July she started her new appointment with the University of Washington, Seattle as a Research Analyst in the College of Forest Resources. Amy can be contacted via email at: ajirka@u.washington.edu or by phone at: (206) 418-8040. (8/07)

Lisa Bell has joined the UCCE Sonoma as the County Sudden Oak Death Coordinator. Her duties include community outreach, collaborating with affected county agencies to develop a county-wide strategic plan for SOD, and assisting with *P. ramorum* research activities. Lisa can be reached at (707) 565-2050 or lkbell@ucdavis.edu. (8/07)

John H. Bowers has been hired as the new USDA APHIS National Survey Coordinator for the PPQ Pest Detection program. As the National Survey Coordinator, John is responsible for national leadership and policy for the Cooperative Agricultural Pest Survey (CAPS). John Bowers can be reached at (301) 734-3658 or via email at john.bowers@aphis.usda.gov. (10/07)