



CALIFORNIA OAK MORTALITY TASK FORCE REPORT APRIL 2004

MONITORING

On March 10, 2004, the California Department of Food and Agriculture (CDFA) announced that *Phytophthora 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 *Phytophthora ramorum* Nursery Survey, in addition to a trace-back survey from a Washington 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 meters 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 meters will go through an additional inspection before shipment. CDFA, USDA Animal and Plant Health Inspection Service (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 disease.

The California Department of Food and Agriculture (CDFA) confirmed the presence of *Phytophthora ramorum* at Specialty Plants nursery in San Diego County on March 11, 2004. Upon confirmation, 7,046 camellia plants were placed on hold.

Under the National SOD Nursery Survey, nurseries considered to be at high-risk for *Phytophthora ramorum* were inspected in Southern California. Of the 60 surveyed nurseries, 14 were found to be suspect for the disease using polymerase chain reaction (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.

The Oregon Department of Agriculture has completed laboratory analyses of samples taken from 33 of the 42 Oregon nurseries being surveyed for *Phytophthora ramorum* because of shipments received from Monrovia Nursery, California. 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.

The Florida Department of Agriculture and Consumer Services has verified the presence of *Phytophthora ramorum* in three Florida retail nurseries in Tallahassee, Jacksonville, and Green Cove Springs. Out of the more than 100 plant samples taken from Florida 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 *Phytophthora ramorum* host plants are being encouraged to check their purchased plants for disease symptoms. Consumers with symptomatic host plants are asked to contact Florida's Department of Agriculture and Consumer Services toll-free helpline at (888) 397-1517.

USDA APHIS has requested additional Commodity Credit Corporation (CCC) monies to expand the National SOD Nursery Survey. Surveys nationwide would be determined based on a series of risk factors, such as climate (temperature, rainfall, leaf wetness), 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 California, Oregon, and Washington as well as several East Coast states. For more information, contact Dan Williams, USDA APHIS, at Daniel.J.Williams@aphis.usda.gov.

REGULATIONS

On March 26, 2004, USDA APHIS and the California Department of Food and Agriculture (CDFA) issued concurrent 60-day quarantines of all nurseries throughout California that ship *Phytophthora ramorum* host plants. The quarantine affects 1500 nurseries throughout California's 58 counties. Currently there are 59 different plants that fall under regulation for *P. ramorum*.

The 60-day regulation will allow regulatory officials time to visually inspect each of the quarantined nurseries for *Phytophthora ramorum* symptoms. Nurseries that are free-from visual symptoms will be certified as free-from the pathogen and allowed to resume host plant shipping. Nurseries exhibiting symptoms will be sampled and host stock will be held for laboratory confirmation. At the end of the 60-day quarantine, government officials will reassess *P. ramorum* regulatory needs.

The California Department of Food and Agriculture (CDFA) has posted statewide SOD survey information to the CDFA website at: http://www.cdffa.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.

The U.S. Department of Agriculture Plant Protection and Quarantine program has implemented a Sudden Oak Death (SOD) hotline (1-888-703-4457). Specialists are staffing the Animal and Plant Health Inspection Service 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 *Phytophthora ramorum* confirmations at Monrovia Nursery, Los Angeles County, and Specialty Plants Inc., San Diego County.

Following the announcement that Monrovia Nursery had been found to have *Phytophthora ramorum*, individual states have imposed bans of various degrees on California's nursery stock for fear of receiving infected plants. Delaware and Tennessee have implemented regulations against specific hosts and associated host plants. Montana



and Arkansas have quarantined all hosts and associated plants unless certified to be *Phytophthora ramorum*-free. Indiana has quarantined all plants in the genera of host and associated host plants unless certified to be free from the pathogen. Georgia and Mississippi issued regulations banning all plants in the genera of host and associated host plants; Alabama's similar quarantine also included soil and wood products. Utah's ban covers all soil and wood products, in addition to only specific host plants. Florida and Louisiana have banned all plants and nursery stock from California; Kentucky and West Virginia's similar regulations include all soil and wood products.

Other states opted to formalize their inspection protocol for new *Phytophthora ramorum* host plant shipments. Oregon finalized their interim rule calling for recipients of CA *P. ramorum* host material to notify Oregon regulatory officials within 24 hours for potential inspection; Washington adopted a similar emergency regulation.

San Luis Obispo County officials are conducting a trace-back survey, 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 the plants can be inspected for disease symptoms.

A policy for response to new detections of *P. ramorum* in wildlands outside the regulated area was drafted March 31-April 1 in Medford, Oregon. Forest pathologists and regulatory officials from Washington, Oregon, California, 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 regulated area. Last fall, a similar protocol was drafted for responses to nursery detections outside the regulated area. For more information, contact Ellen Goheen, USDA Forest Service, at egoheen@fs.fed.us.

RESEARCH

UC Berkeley researchers have confirmed the susceptibility of wood rose (*Rosa gymnocarpa*) to *Phytophthora ramorum*, making it the latest plant to join the list of regulated host species (see [photo](#)). The results of their research have been published in the journal *Plant Disease*, April 2004, Vol. 88, #4. "First report of foliar blight of *Rosa gymnocarpa* by *Phytophthora ramorum*." D. Hüberli, K. D. Reuther, A. Smith, S. Swain, J. G. Tse, and M. Garbelotto.

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. Wood rose is native to California, and is commonly found in a wide range of habitats. It is popular in the horticultural industry and is readily available from native plant nurseries in California, Oregon, Washington, and British Columbia. For more information, see "Host of the Month" below.

California rose (*R. californica*), another common CA wild rose, was lab inoculated with *Phytophthora 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 Rosaceace family. Huberli is currently testing susceptibility of commercial hybrid roses.

In their April 2004 Mycological Research article, “Investigations in the Genetic Diversity of *Phytophthora ramorum*,” Kelly Ivors, Matteo Garbelotto, and others compare the genetic structure of *Phytophthora 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 (in this case, the nad 5 and cox II genes, and the ITS region), 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 (polymerase chain reaction) 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 California and 2 Oregon counties (including 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. However, the recent discovery of A1 isolates in some US nurseries provides an example of the potential for how the two types could eventually meet and recombine, producing offspring that could be more diverse.

The 2004 Request for Proposals for Sudden Oak Death/*Phytophthora ramorum* research has been issued by the USDA Forest Service, Pacific Southwest Research Station. Proposals are due April 14, 2004. Approximately \$800,000 will be awarded for *P. ramorum* research. For further information, contact Patrick Shea, PSW SOD Research Administrator, at pjshea@davis.com.

MANAGEMENT

Prior to the removal of infected California bay laurel trees and seedlings in Redway (Southern 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. Samples from the vehicle washing area were negative. 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 February, the removals totaled seven California bay laurel trees, (5-11" diameter at breast height [dbh]), 31 bay saplings (1-5" dbh), and 44 seedlings (less than 1" dbh and less than 12" tall).

UC Extension, in cooperation with Shannon Murphy and John Bienapfl (Rizzo laboratory, UC Davis), has also set up a network of stream survey sites from southern Humboldt County to the Oregon border, including several sites near the Redway infection. Sampling equipment will be installed, and monitoring will start, by the beginning of April. In addition, UC Extension 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 will begin in April. For more information contact Chris Lee, UCCE Humboldt/Del Norte, at cale@ucdavis.edu.



CALENDAR OF EVENTS

4/22 – Free training session on “Recognition, Sampling, Treatment, and Mitigation Measures for Sudden Oak Death.” This one-day class will be held in the southern region of the regulated area at Camp May-Mac, Felton, from 9:30 a.m. – 4:00 p.m. Registration is required. For more information, contact Lucia Briggs, at lbriggs@nature.berkeley.edu.

5/19 – Free training session on “Recognition, Sampling, Treatment, and Mitigation Measures for Sudden Oak Death.” This one-day class will be held in the northern region of the regulated area at the Marin Center, San Rafael (a.m. lecture) and China Camp State Park, San Rafael (p.m. field session), from 9:30 a.m. – 4:00 p.m. Registration is required. For more information, contact Lucia Briggs, at lbriggs@nature.berkeley.edu.

HOST OF THE MONTH

***Rosa gymnocarpa* (baldhip rose, wood rose, or dwarf rose)** - Wood rose is a common and very widespread shrub in the western United States. It is found in wildland habitats ranging from redwood forests to chaparral and mountain grasslands, from British Columbia to California’s Sierra Nevada mountains, and east into Idaho and western Montana. It grows at elevations up to 5,000 feet, tolerating shade as well as sunlight, thriving in moist and dry areas.

Wood rose plants tend to have one or two spindly stalks that are up to 5 feet tall. The stalks are covered with numerous fine, soft prickles, rather than the heavy, stiff thorns common in most roses. It bears 1 ½ inch pink flowers in late spring or early summer, and showy, bright red fruits (hips) in mid-summer that can persist through the winter. The sepals fall away from the hips early in their development, giving the species its common name (baldhip rose). Deer and livestock browse the foliage of wood rose; its winter persistence makes the hips an especially important source of food for mammals and birds.

While quite nutritious, the hips have been eaten sparingly by Native Americans, as the seeds are covered with hairs that are quite irritating to the digestive system. Other traditional uses include using the leaves to make tea for drinking and for medicinal purposes, as well as for drying and smoking the bark and leaves.

References:

Hüberli, D., Reuther, K.D., Smith, A., Swain, S., Tse, J.G. and Garbelotto, M. (2004) First report of foliar infection of *Rosa gymnocarpa* by *Phytophthora ramorum*. Plant Disease online: <http://apsnet.org/pd/current/top.asp>

Morelejo, E. and Hernandez, L. Inoculation Trials of *Phytophthora ramorum* on Detached Mediterranean Sclerophyll Leaves. Sudden Oak Death Science Symposium, 2002. <http://danr.ucop.edu/ihrmp/sodsymp/paper/paper25.html>



Plants of Garland Park website:

http://www.coestatepark.com/rosa_gymnocarpa_garland.htm

Pojar, J. and MacKinnon, A. 1994. Plants of the Pacific Northwest Coast. BC Ministry of Forests and Lone Pine Publishing, Vancouver, BC.

USDA Forest Service, Fire Effects Information System

<http://www.fs.fed.us/database/feis/plants/shrub/ros gym/all.html>