CALIFORNIA OAK MORTALITY TASK FORCE REPORT
MARCH 2010

FEATURE ARTICLE

Shift in *Phytophthora ramorum* populations in Washington State - The EU1 strain is now the most common *P. ramorum* lineage detected in WA state nurseries and non-nursery sites, with a concurrent rise in NA2 and decrease in NA1. Evaluation of genotypes over the past 5 years by Gary Chastagner, Katie Coats, and Marianne Elliott at Washington State University shows the reversal in genotype frequency occurred in 2008 and persisted into 2009. They detected EU1 in 99 positive samples at seven locations, NA1 in 17 samples at four sites, and NA2 in 48 samples at three sites in 2009. In contrast, the first year of the study (2005) identified four EU1 samples at one site, 103 NA1 samples at 14 sites, and 12 NA2 samples at five sites.

Of the 46 Washington nurseries found positive since 2003, five had infected plant detections in 2009. Twenty nurseries have been confirmed positive at least two years. Two of these sites were found to have positive plants three different years and two sites were positive four years. Genotype analysis has been performed on samples from 31 nurseries since 2005. Of the nurseries with multiple confirmed years, six had various combinations of two lineages for one or two years and one had a year with all three lineages followed by two other years with two lineages present each year.

Nine Washington non-nursery sites (landscapes, water, soil or trace-forward landscape plants) have also been identified *P. ramorum* positive since 2005, with seven sites having been positive in 2008 and/or 2009. Of the seven sites, the Rosedale Stream (Pierce County) has been found positive for four years (NA1) and the Sammamish River (King County) has been confirmed positive for three years (several lineages). A Pierce County site with NA2-positive salal plants was also found adjacent to nursery property, and four residential sites have been found in the past two years, all of which have been identified with the EU1 strain (two residences were found with the EU1 strain in 2008 and 2009, one with plants and soil, and one with just soil). These four residential sites were trace-forwards from the same EU1-positive nursery.

In 2009, a new systematic sampling method was implemented, which involved not only genotyping the original DNA sample, but also a second round of sampling using the same plant and/or bait material from which the DNA positive was detected. In addition, through a cooperative effort with the Washington State Department of Agriculture and the USDA Animal and Plant Health Inspection Service (APHIS), a third round of sampling was performed on whole plants or plant material collected from most of the nurseries prior to destruction of the plant material. This duplicate and triplicate sampling allowed for a better representation of the genetic distribution of the *P. ramorum* population.

In total, 450 samples from 31 nurseries, three water sites, and six landscape locations have been analyzed. For more information on the study and its findings, contact Gary Chastagner at chastag@wsu.edu.

REGULATIONS

Ten species have been added to the list of federally regulated *P. ramorum* associated host plants. The USDA Animal and Plant Health Inspection Service (APHIS) issued the on 2/22/10, adding Mexican-orange (*Choisya ternate*), kousa dogwood (*Cornus kousa*), *Daphniphyllum glaucescens*, European holly (*Ilex aquifolium*), Japanese-oak (*Lithocarpus glaber*), *Magnolia cavalieri*, *Magnolia foveolata*, bayleaf currant (*Ribes laurifolium*), bilberry (*Vaccinium myrtillus*), and lingon berry (*Vaccinium vitis-idaea*) to the list. Symptoms for each of the new hosts other than bilberry were leaf necrosis. Tip dieback occurs in infected bilberry as well as *Daphniphyllum glaucescens* These species were identified as susceptible by the Canadian Food Inspection Agency (CFIA) and the United Kingdom's Food and Environment Research Agency (FERA).

Nurseries currently operating under an APHIS *P. ramorum* compliance agreement are able to continue shipping hosts and associated plants, including the newly listed plants; however, any nurseries not currently under a compliance agreement that contain these new species must be properly inspected, sampled, tested, and placed under a Compliance Agreement by 3/31/10 in order to be able to move any plants interstate.

MANAGEMENT

2009 Summary Report for Sudden Oak Death Activity in Curry County, Oregon – *ramorum* was found in 102 new infected trees in Oregon in 2009, representing 20 infested acres (down from 2008) in 59 sites. All of the infested sites were within the quarantine area and had relatively few infected trees, suggesting early detection. Since 2007, the number of new sites identified per year has not continued to increase. Of the 59 detected sites in 2009, 56 treatment areas were delimited, totaling 700 acres. All of the federal land treatment sites have completed treatment or are underway. While most of the new outlying private land sites received at least partial treatment, eradication treatments on private land were left largely incomplete due to funding shortages. However, it is anticipated that private land treatments will resume in March 2010 when federal Stimulus Program funds become available.

Monitoring of treatment effectiveness has been examined at 119 Oregon sites from 2001 and 2007. The overall rate of pathogen recovery has been 3 percent of all samples, with 38 percent of sites found to have positive soil and 10 percent of sites with positive plant material. Assessments of aerially applied Agri-Fos® have shown that the chemical does get into the trees, but evidence is inconclusive as to its impact on disease spread. Plot assessments are underway to further analyze the May 2009 aerial application and stem injections. Inoculum production monitoring via baited rainfall buckets is ongoing as are stream monitoring efforts. ODF detection and monitoring activities will continue, and are supported by the BLM, USDA FS PSW Research Station, and USDA FS Forest Health Protection, Pacific Southwest and Pacific Northwest Regions and Region 6.

State budget cuts in 2009 reduced the amount of available federal funds that could be accepted due to lack of a non-federal money match. A $2.67 million ARRA grant was awarded in early 2010 and will allow eradication and host removal programs to resume. Oregon program issues for 2010 include a shortage of the necessary non-federal match money available at the project-level to secure federal dollars, and delays in receipt of grant awards (up to 12 months). These delays are costly to projects and may contribute to disease spread.

FUNDING

The National Ornamental Research Site at Dominican University (NORS-DUC) has issued a 2010 Request for Proposals (RFP). Approximately $100,000 is available to be awarded for projects ranging from $5,000 to $35,000. Researchers who already have funding, but are in need of space for their project, are strongly encouraged apply; however, a negotiated space usage fee may be required.

Proposals are **due by Friday, April 16, 2010** to RFP.norsduc@dominican.edu. The document should be in PDF format, and should include a travel budget, salaries (other than for the principal investigator), materials, supplies, and equipment. Notification of funded projects will be announced on Friday, June 4, 2010. Projects may begin as of July 1, 2010. For RFP details, including research priorities and review criteria, go to www.dominican.edu/norsduc. For questions, contact Dr. Sibdas Ghosh at sibdas.ghosh@dominican.edu or 415-482-3583.

RESEARCH

The fifth meeting of the IUFRO *Phytophthora* Diseases in Forests and Natural Ecosystems Book of Abstracts is now available. To access more than 40 pages of abstracts, go to http://www.phyto2010.com/Abstracts%2012%20Feb%2010.pdf. The meeting will be held March 7 – 12, 2010 in New Zealand.

Sechler, K.E.; Carras, M.M.; Shishkoff, N. and Tooley, P.W. 2010. Adaptation of a *Phytophthora ramorum* real-time polymerase chain reaction assay based on a mitochondrial gene region for use on the Cepheid SmartCycler. Online. Plant Health Progress DOI: 10.1094/PHP-2010-0212-01-RS.

Abstract: Detection of *Phytophthora ramorum* in US commercial nurseries has led to a number of quarantine regulations. Methods such as real-time PCR (RT-PCR) provide rapid and reliable detection that can supplement attempts to culture *P. ramorum* from symptomatic tissue. We adapted and optimized a previously described mitochondrial gene-based RT-PCR assay for use with a Cepheid SmartCycler v.1 and ready-to-use lyophilized PCR beads. The detection limit was 10 fg of *P. ramorum* genomic DNA. No cross-reactivity was observed on the SmartCycler for seven additional *Phytophthora* species tested, which included species known to cross-react in other assays as well as recently described species *Phytophthora foliorum* and *P. kernoviae*. The SmartCycler assay described here was used to detect *P. ramorum* in a set of 2008 California field samples with a high degree of accuracy.

Yakabe, L.E. and MacDonald, J.D. 2010. Soil treatments for the potential elimination of *Phytophthora ramorum* in ornamental nursery beds. Plant Disease 94:320-324.

Abstract: Ramorum leaf blight, caused by *Phytophthora ramorum*, has reemerged at several California nurseries after removal of infested material. In many cases, reemergence was not associated with reintroduction of the pathogen and may be attributed to inoculum surviving in soil beds because *P. ramorum* propagules can survive for over a year in soil. Using artificially infested soil in microcosms, fumigation and heat treatments were examined as potential eradicants of *P. ramorum* from soil. Treatments with chloropicrin, Vapam, and iodomethane were effective in reducing *P. ramorum* propagules below detection limits. Basamid was consistently effective only when fully incorporated into the soil. Application of Basamid (392 kg/ha) at infested ornamental nursery sites mirrored results from microcosm experiments, indicating that a tarp cover over treated soil is necessary for reliable efficacy. Dimethyldisulfide, 1,3-dichloropropene, and two formulations of hydrogen dioxide were less effective, resulting in only partial reduction of propagules. In heat treatments, *P. ramorum* in soil microcosms remained detectable 42 days after microcosms were incubated at 30 and 22°C but was not detectable in soil heated above 40°C for 3 days. Results from a solarized field plot indicate that prolonged sublethal temperatures, between 35 and 40°C for 42 days, can be effective in eliminating detectable propagules of *P. ramorum*.

RELATED RESEARCH

Anderson, P.; Brundrett, M.; Grierson, P.; and Robinson, R. 2010. Impact of severe forest dieback caused by *Phytophthora cinnamomi* on macrofungal diversity in the northern jarrah forest of Western Australia. Forest Ecology and Management 259: 1033–1040. DOI: 10.1016/j.foreco.2009.12.015.

Dunstan, W.A.; Rudman, T.; Shearer, B.L.; Moore, N.A.; Paap, T.; Calver, M.C.; Dell, B.; and St. J. Hardy, G.E. 2009. Containment and spot eradication of a highly destructive, invasive plant pathogen (*Phytophthora cinnamomi*) in natural ecosystems. Biological Invasions. DOI 10.1007/s10530-009-9512-6. Online at http://www.springerlink.com/content/gj86781623708672/.

RESOURCES

In December 2009, the California Oak Foundation (COF) and California Wildlife Foundation (CWF) merged. COF will now be known as California Oaks (CO) and it will work under the CWF federal non-profit tax identification number: 68-0234744. CO will continue to be focused on conserving and perpetuating native oak woodlands in order to achieve sustainable wildlife habitat and a stable, livable climate. The CO website (www.californiaoaks.org) will continue to be in operation, offering downloadable free publications and information. Phone numbers and email addresses will remain the same. The new mailing address for California Oaks is: CWF/California Oaks, 428 13th Street, 10-A, Oakland, CA 94612.

CALENDAR OF EVENTS

3/7 – 3/12 - 5th IUFRO *Phytophthora* in Forest Trees and Natural Ecosystems Conference; Rotorua, New Zealand; For more information or to register, go to http://www.phyto2010.com/registration.html.

3/10 - SOD Treatment Workshop; Meet at oak outside of Tolman Hall, UC Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. This class is free and will be held rain or shine. To register, email kpalmieri@berkeley.edu, and provide your name, phone number, affiliation (if applicable), and the date for which you are registering. For more information, go to http://nature.berkeley.edu/garbelotto/english/sodtreatmenttraining.php or contact Katie Palmieri at (510) 847-5482 or kpalmieri@berkeley.edu.

4/21 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 3/10 listing above.

5/12 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 3/10 listing above.

6/9 – 6/10 – COMTF-wide meeting; Dominican University; 50 Acacia Avenue; San Rafael, CA 94901-2298; Additional information will be forthcoming. For questions, contact Katie Palmieri at (510) 847-5482 or kpalmieri@berkeley.edu.