



## CALIFORNIA OAK MORTALITY TASK FORCE REPORT JUNE 2013

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### NURSERIES

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***Phytophthora ramorum*-positive *Rhododendron* plants were identified at a Lane County, Oregon retail nursery on 5/23.** The facility does ship interstate, and also tested positive in 2006, 2009, 2011, and 2012. This brings the total number of 2013 infested Oregon nurseries to seven; four of the seven nurseries had positive detections in previous years.

**Washington had two nurseries found *P. ramorum* positive in May (in Thurston and King County)** during recertification surveys. The King County nursery was under an emergency action notice from last year and undergoing their final release survey when the positive rhododendron (not on site during previous surveys) was identified. Both facilities sell to the landscape trade, and neither has shipped hosts to other states in the past six months. Positive plants identified were *Viburnum tinus* and rhododendron. Delimiting surveys have not turned up additional positive plants at either facility; however, some results are still pending.

### RESEARCH

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**Hummel, R.L.; Elliott, M.; Chastagner, G.; Riley, R.E.; Riley, K.; and DeBauw, A.** 2013. Nitrogen Fertility Influences Growth and Susceptibility of Rhododendrons to *Phytophthora ramorum*. HortScience 48(5):601–607.

Abstract: Growth and susceptibility of evergreen *Rhododendron* ‘English Roseum,’ ‘Cunningham’s White,’ and ‘Compact P.J.M.’ to *Phytophthora ramorum* in response to biweekly nitrogen (N) fertilizer application at rates of 25, 75, and 150 mg N per 11.4-L container was evaluated during two growing seasons. At the end of both growing seasons, horticultural evaluation of the different plants showed that 150 mg N-fertilized cultivars had superior shoot growth, visual quality, leaf color, and the highest leaf N concentration, whereas the 25-mg N cultivars were inferior for these characteristics. Plants fertilized with the 75-mg N rate were typically intermediate to the 150- and 25-mg N plants for the measured characteristics. During the first growing season, the number of flower buds on ‘Cunningham’s White’ and ‘English Roseum’ was not influenced by N rate but the second season bud numbers increased with increasing N fertilizer. Foliar susceptibility to *P. ramorum* was influenced by N fertilizer application rates in the most susceptible cultivars, ‘English Roseum’ and ‘Cunningham’s White,’ in which lesion size and infection frequency both increased at higher N rates. The results were variable in ‘Compact P.J.M.’ the most resistant cultivar.

**Stong, R.A.; Kolodny, E.; Kelsey, R.G.; González-Hernández, M.P.; Vivanco, J.M.; and Manter, D.K.** 2013. Effect of plant sterols and tannins on *Phytophthora ramorum* growth and sporulation. Journal of Chemical Ecology. 2013:1-11. May. 10.1007/s10886-013-0295-y.



Elicitin-mediated acquisition of plant sterols is required for growth and sporulation of *Phytophthora* spp. This study examined the interactions between elicitins, sterols, and tannins. Ground leaf tissue, sterols, and tannin-enriched extracts were obtained from three different plant species (California bay laurel, California black oak, and Oregon white oak) in order to evaluate the effect of differing sterol/tannin contents on *Phytophthora ramorum* growth. For all three species, high levels of foliage inhibited *P. ramorum* growth and sporulation, with a steeper concentration dependence for the two oak samples. *Phytophthora ramorum* growth and sporulation were inhibited by either phytosterols or tannin-enriched extracts. High levels of sterols diminished elicitin gene expression in *P. ramorum*; whereas the tannin-enriched extract decreased the amount of 'functional' or ELISA-detectable elicitin, but not gene expression. Across all treatment combinations, *P. ramorum* growth and sporulation correlated strongly with the amount of ELISA-detectable elicitin ( $R^2 = 0.791$  and  $0.961$ , respectively).

**Tooley, P.W.; Browning, M.; and Leighty, R.M. 2013. Inoculum Density Relationships for Infection of Some Eastern US Forest Species by *Phytophthora ramorum*.** Journal of Phytopathology. doi: 10.1111/jph.12107. Early view.

**Abstract:** Our objectives were to establish inoculum density relationships between *P. ramorum* and selected hosts using detached leaf and whole-plant inoculations. Young plants and detached leaves of *Quercus prinus* (Chestnut oak), *Q. rubra* (Northern red oak), *Acer rubrum* (red maple), *Kalmia latifolia* (mountain laurel) and *Rhododendron* 'Cunningham's White' were dip inoculated with varying numbers of *P. ramorum* sporangia, and the total number of diseased and healthy leaves recorded following incubation at 20°C and 100% relative humidity. Calibration threshold estimates for obtaining 50% infected leaves based on linear analysis ranged from 36 to 750 sporangia/ml for the five hosts. Half-life (LD50) estimates (the number of spores for which the percent of diseased leaves reaches 50% of its total) from asymptotic regression analysis ranged from 94 to 319 sporangia/ml. Statistically significant differences ( $P = 0.0076$ ) were observed among hosts in percent infection in response to increased inoculum density. Inoculum threshold estimates based on studies with detached leaves were comparable to those obtained using whole plants. The results provide estimates of inoculum levels necessary to cause disease on these five *P. ramorum* hosts and will be useful in disease prediction and for development of pest risk assessments.

#### **FEATURED RESEARCH**

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**NORS-DUC Research Update on Soil Solarization – Dr. Jennifer Parke and Fumiaki Funahashi** (graduate student), Oregon State University

In 2012, two field trials were conducted at National Ornamentals Research Site at Dominican University of California (NORS-DUC) to determine the effectiveness of soil solarization (with and without a subsequent *Trichoderma* biocontrol agent amendment) in reducing survival of *Phytophthora ramorum* inoculum in infested nursery soil. Treatments included solarized and non-solarized plots, each 2.5 x 2.5 m, with six replicates. *Rhododendron* leaf disks infested with *P. ramorum* were buried in soil at 5



cm, 15 cm, and 30 cm, and plots were either solarized (covered with a clear plastic sheet) or not solarized (left uncovered). Leaf disks were removed at regular intervals and monitored for outgrowth of *P. ramorum* on a *Phytophthora* selective medium (PARPH).

In the first trial, initiated in mid-July and sampled 4 weeks later, there was no recovery of *P. ramorum* from the solarized plots at any soil depth; whereas, average recovery in the non-solarized plots was 78% at 5 cm, 98% at 15 cm, and 97% from the 30 cm depth. Solarization increased the daily maximum soil temperature by 6-10°C at each depth. In the second trial initiated in mid-August, plots were sampled at 2 and 4 weeks. By 2 weeks, there was no recovery of *P. ramorum* from the 5 cm or 15 cm depth, but *P. ramorum* was recovered from 65% of the leaf disks at the 30 cm depth, even after 6 weeks of solarization. Recovery was not affected by application of the biocontrol agent in either experiment.

Soil solarization under the test conditions in CA appears to offer an effective means of eliminating *P. ramorum* from at least the upper layers (top 15 cm) of the soil profile, where most of the naturally occurring inoculum is located. Efforts are underway to model the survival of *P. ramorum* in relation to soil temperature and moisture. Additional research in 2013 is aimed at understanding how to maximize the effectiveness of solarization in killing soilborne *Phytophthora* species in CA, OR, and WA, and to determine how the presence of crushed rock on the soil surface affects soil heating. Commercial nurseries in CA, OR, and WA interested in participating in 2013 solarization trials are encouraged to contact [Jennifer.Parke@oregonstate.edu](mailto:Jennifer.Parke@oregonstate.edu) for further information.

#### RELATED RESEARCH

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**Machado, P. da S.; Alfenas, A.C.; Coutinho, M.M.; Silva, C.M.; Mounter, A.H.; Maffia, L.A.; Freitas, R.G. de; and Freitas, C. da S.** 2013. Eradication of plant pathogens in forest nursery irrigation water. *Plant Dis.* 97:780-788.

**Quinn, L.; O'Neill, P.A.; Harrison, J.; Paskiewicz, K.H.; McCracken, A.R.; Cooke, L.R.; Grant, M.R.; and Studholme, D.J.** 2013. Genome-wide sequencing of *Phytophthora lateralis* reveals genetic variation among isolates from Lawson cypress (*Chamaecyparis lawsoniana*) in Northern Ireland. *FEMS Microbiology Letters.* doi: 10.1111/1574-6968.12179.

**Reeser, P.; Sutton, W.; and Hansen, E.** 2013. *Phytophthora pluvialis*, a new species from mixed tanoak-Douglas-fir forests of western Oregon, U.S.A. *North American Fungi* 8(7): 1-8. [http://dx.doi: 10.2509/naf2013.008.007](http://dx.doi.org/10.2509/naf2013.008.007).

**Than, D.J.; Hughes, K.J.D.; Boonhan, N.; Tomlinson, J.A.; Woodhall, J.W.; and Bellgard, S.E.** 2013. A TaqMan real-time PCR assay for the detection of *Phytophthora* 'taxon Agathis' in soil, pathogen of Kauri in New Zealand. *Forest Pathology.* doi: 10.1111/efp.12034. (Early view)

**EDUCATION AND OUTREACH**

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**The Chelsea Flower Show in London featured a “Stop the Spread” garden complete with an avenue of bare and lifeless trees and a border of threatened species**

<http://www.fera.defra.gov.uk/events/chelsea2013/documents/Chelsea%202013%20Visual.pdf>. The UK Food and Environment Research Agency sponsored the garden at the Royal Horticulture Society’s centennial flower show, the most prestigious in the UK,

visited by over 150,000 people. The garden was awarded a silver medal. For more information, go to

<http://www.fera.defra.gov.uk/events/chelsea2013/aboutTheGarden.cfm>.

**RESOURCES**

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***Phytophthora: A Global Perspective, is a compendium of Phytophthora species*** impacting crops, forests, nurseries, greenhouses and natural areas worldwide. Chapters cover major hosts, identification, epidemiology, management, current research, future perspectives, and the impacts of globalization on *Phytophthora*. Edited by Kurt Lamour, University of Tennessee, more information can be found at

<http://bookshop.cabi.org/?page=2633&pid=2611&site=191>.

**CALENDAR OF EVENTS**

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- 6/1 - Atherton SOD Blitz; Carriage House; Holbrook Palmer Park; 150 Watkins Ave.;** Atherton; 10:00 a.m. – noon; For more information, contact Susan Finocchio at [susanfin@earthlink.net](mailto:susanfin@earthlink.net).
- 6/8 - Los Altos Hills SOD Blitz; Los Altos Hills Town Hall; 26379 Fremont Rd.;** Los Altos Hills; 10:00 a.m. to noon; For more information, contact Sue Welch at [sodblitz09@earthlink.net](mailto:sodblitz09@earthlink.net).
- 6/15 - Sonoma SOD Blitz, Option 1 - Santa Rosa; Environmental Discovery Center at Spring Lake Park, 393 Violetti Road, Santa Rosa.;** 10:00 a.m. – noon; For more information, contact Phyllis Turrill at [rainbow3@comcast.net](mailto:rainbow3@comcast.net).
- 6/15 - Sonoma SOD Blitz, Option 2; Sonoma Community Center; 276 East Napa Street;** Sonoma; 10:00 a.m. – noon; For more information, contact Phyllis Turrill at [rainbow3@comcast.net](mailto:rainbow3@comcast.net).
- 6/15 - Sonoma SOD Blitz, Option 3; Sebastopol; Veterans' Memorial Bldg, 282 High Street, Sebastopol;** 10:00 a.m. – noon; For more information, contact Phyllis Turrill at [rainbow3@comcast.net](mailto:rainbow3@comcast.net).
- 6/15 - Napa SOD Blitz; UC Cooperative Extension Office, 1710 Soscol Avenue,** Napa; Time to be determined; For more information, contact Bill Pramuk at [info@billpramuk.com](mailto:info@billpramuk.com) or Henni and Gerrald Cohen at [hennic1044@gmail.com](mailto:hennic1044@gmail.com).
- 6/15 - Protect the Value of Your Forest: A Workshop for Forest Landowners;** UC Berkeley Campus; 159 Mulford Hall at Oxford Ave. and University Ave.; Berkeley; 9:30 a.m. - 3:00 p.m.; Registration is \$25 and is available online at <http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=10294>. For more information, go to <http://ucanr.edu/sites/forestry/Events/?calendar=yes&g=28858> or contact Rick Standiford at [standifo@berkeley.edu](mailto:standifo@berkeley.edu).
- 6/22 - Protect the Value of Your Forest: A Workshop for Forest Landowners;** Placer County UCCE office, DeWitt Center, Room 306; 11477 E Avenue;



- Auburn; 9:30 a.m. - 3:00 p.m.; Registration is \$25 and is available online at <http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=10294>. For more information, go to <http://ucanr.edu/sites/forestry/Events/?calendar=yes&g=28858> or contact Rick Standiford at [standifo@berkeley.edu](mailto:standifo@berkeley.edu).
- 8/24 - 25 - Fifth *Phytophthora*, *Pythium*, and Related Genera Workshop; Beijing, China;** The first day focuses on the methodology for studying Oomycetes (particularly *Phytophthora* and *Pythium* species), while the second day will cover contemporary research topics. The meeting is being held in conjunction with the 10<sup>th</sup> International Congress of Plant Pathology. For abstract submission, registration, and workshop information, go to <http://www.icppbj2013.org/file/workshop/5thInternationalWorkshop.asp>.
- 9/4 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus;** 1:00 – 3:00 p.m.; Pre-registration is required. For more information, see the 4/10 listing above.
- 10/2 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus;** 1:00 – 3:00 p.m.; Pre-registration is required. For more information, see the 4/10 listing above.
- 10/23 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus;** 1:00 – 3:00 p.m.; Pre-registration is required. For more information, see the 4/10 listing above.
- 11/13 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC Berkeley Campus;** 1:00 – 3:00 p.m.; Pre-registration is required. For more information, see the 4/10 listing above.