CALIFORNIA OAK MORTALITY TASK FORCE REPORT
JULY 2010

MONITORING

Water draining an infested nursery in Mecklenburg County (Charlotte), NC has been found to have *Phytophthora ramorum* as a result of the 2010 National *P. ramorum* Early Detection Survey of Forests. The rhododendron leaf baits were deployed by survey cooperators in the NC Forest Service and diagnosis made from several baiting periods via PCR by the survey's Eastern Regional Diagnostic Lab at the Pennsylvania Department of Agriculture. This brings the total number of positive waterways to 10 in six states outside areas where *P. ramorum* is found in California and Oregon forest areas (WA [2], AL [4], MS [1], GA [1], FL [1], and NC [1]). Cooperative streamside vegetation surveys are being planned for the fall by the USDA Forest Service, NC Forest Service, and NC Department of Agriculture and Consumer Services to determine if the pathogen has become established in terrestrial ecosystems.

***P. ramorum* has been found in South Wales infecting Japanese larch trees in** woodlands managed by Forestry Commission Wales. This is the first time the pathogen has been found in larch outside southwest England. Discovered as a result of aerial flyovers and follow-up ground surveys, widespread infection is occurring on larch trees of all ages. While figures for Japanese larch alone are not available, it is known that the three larch species found in Britain cover an estimated 134,000 hectares, or approximately five percent of the total woodland area (8% in Wales, 4.3% in England, and 5.1% in Scotland).

Fewer than 100 trees had been found *P. ramorum* positive in Britain prior to August 2009 when Japanese larch was first found to be a host. In response, Forestry Commission England implemented a program of felling infected trees, along with a range of biosecurity measures. A similar program is now underway in Wales, removing infected trees, destroying other infected species, and implementing biosecurity measures in an effort to minimize the spread of infested soil and larch needles via people, vehicles, equipment and timber. For more information, go to the Forestry Commission's website at www.forestry.gov.uk/pramorum.

The *P. ramorum* watercourse detection in Redwood Creek in northern Humboldt County has been followed with the discovery of an infected bay laurel along the stream. The infected tree is located approximately 20 miles southwest of the stream leaf baits that were used for initial detection. USDA Forest Service Forest Health Protection, Forest Health Monitoring conducted two overflights of the watershed and detected patches of scattered individual dead tanoak in an area across the stream from the infected tree. Representatives from CAL FIRE, UC Davis, and COMTF met with Redwood Creek landowners to discuss detection and management options on June 24. This meeting resulted in plans for systematic surveys of suspect streamside and upland vegetation along Redwood Creek; those surveys are already underway, with samples coming in for processing at UCCE Humboldt and follow-up inspection by the UC Davis Rizzo Lab. Additionally, the UC Berkeley Garbelotto Lab is working on genotyping the isolates

from the watercourse and infected bay tree. For more information, contact Yana Valachovic at yvala@ucdavis.edu or (707) 445-7351.

NURSERIES

As of 6/18/10, the Oregon Department of Agriculture has completed testing for the 2010 *P. ramorum* Federal Order Survey on 12,101 samples collected from 299 nursery grower locations, and has detected six positive nurseries. The Confirmed Nursery Protocol has been enacted at each location with a positive detection, and trace-forward information has been shared with USDA APHIS. During delimitation surveys at one of the Washington County nurseries, foliar samples were collected from a *Trachelospermum jasminoides* (star jasmine) plant exhibiting suspicious symptoms. The foliage was officially confirmed *P. ramorum* positive on 6/10/2010. A single *P. ramorum* isolate was obtained and will be used to perform Koch's Postulates. The symptoms observed included a leaf spot and early dehiscence of infected leaves (see attached photos). Star jasmine was also found positive in June 2010 at a Sacramento County, CA production nursery. As there have been two independent confirmations of infected star jasmine, it is anticipated that APHIS will be adding this newly identified host to the *P. ramorum* list of regulated species.

A Johnson County, Iowa retail nursery was confirmed *P. ramorum* positive on 6/22/10 as a result of a trace-forward inspection of plants shipped from a positive production nursery in Washington County, Oregon. The retail nursery protocol has been implemented. The positive species identified was *Rhododendron* sp. Skookum. The nursery has not been previously positive for the pathogen.

REGULATIONS

USDA APHIS has delayed the effective date for implementation of the Federal Order requiring pre-notification for shipping *P. ramorum* host nursery stock from regulated and quarantine areas from June 21, 2010 to July 19, 2010. The extension will provide additional time to put in place necessary measures. Advanced notification will allow states receiving *P. ramorum* host nursery stock to assign and prioritize resources, assure rapid response, and provide direct traceability for any nursery stock (as defined under 7 CFR 301.92-2) known to be positive for *P. ramorum*. For more information, contact Prakash K. Hebbar at prakash.hebbar@aphis.usda.gov or (301) 734-5717.

RESEARCH

Alexander, J. and Lee, C.A. 2010. Lessons Learned from a Decade of Sudden Oak Death in California: Evaluating Local Management. Environmental Management. DOI 10.1007/s00267-010-9512-4. Available online at http://www.springerlink.com/content/808h7716t14n4887/.

Abstract: Sudden Oak Death has been impacting California's coastal forests for more than a decade. In that time, and in the absence of a centrally organized and coordinated set of mandatory management actions for this disease in California's wildlands and open spaces, many local communities have initiated their own management programs. We

present five case studies to explore how local-level management has attempted to control this disease. From these case studies, we glean three lessons: connections count, scale matters, and building capacity is crucial. These lessons may help management, research, and education planning for future pest and disease outbreaks.

The following 13 abstracts on *P. ramorum* are being presented at the 2010 APS Annual Meeting in Charlotte, NC August 7-11th.

Bilodeau, G.; Martin, F.N.; Coffey, M.D.; and Blomquist, C.L. 2010. Development of a multiplex assay for genus and species-specific detection of *Phytophthora* based on differences in mitochondrial gene order. Phytopathology 100:S14.

The genus *Phytophthora* contains more than one hundred described species and given their importance to agriculture accurate and rapid detection tools are essential. A range of markers have been developed for this genus, usually based on polymorphisms at primer annealing sites that rely on accurate control of annealing temperature for specificity. An alternative approach for enhanced specificity is to design markers based on differences in the location of annealing sites. We have looked at gene order differences in the mitochondrial genome of *Phytophthora* compared to *Pythium* and plants for developing a single amplification assay for genus as well as species specific detection (single amplification primer pair with TaqMan probes for genus and species-specific ID). Three conserved gene order differences have been identified with conserved regions suitable for genus specific detection adjacent to variable regions for species-specificity. Two of these should allow for design of species-specific probes for more than 65 species. The amplification primers and genus specific probe were effective when evaluated against a wide range of isolates representing all formally and provisionally described *Phytophthora* spp. as well as a number of *Pythium* spp. and plants. Multiplex amplifications with species-specific probe combinations *P. ramorum-kernoviae, P. fragariae-citricola-cactorum* and *P. alni* were also effective and are under evaluation with field samples.

Bohannon, R.C. and Russell, P. 2010. Field detection of *Phytophthora ramorum* DNA within 30 minutes. Phytopathology 100:S15.

Agdia, Inc. has developed a method to detect plant pathogen DNA in less than 30 minutes, start to finish, using a new isothermal DNA amplification system. Initial tests were developed to detect *Phytophthora ramorum* as the prototypic target analyte, owing to its importance in the ornamental field and association with Sudden Oak Death syndrome…responsible for killing millions of trees in California and Oregon. The new system successfully demonstrated 100% specificity for *P. ramorum* in over 70 samples tested from *Phytophthora and Pythium* lineages and demonstrated extremely low levels of detection. Tests were developed against other relevant pathogens and a system developed to give users an answer in the field, or lab, in less than 5 minutes without the need for instrumentation for selected analytes. Discussion of this breakthrough and technology will be presented.

Brennan, J.; Cummins, D.; Kearney, S.; Cahalane, G.; Nolan, S.; and Choiseul, J. 2010. *Phytophthora ramorum* and *Phytophthora kernoviae* in Ireland: The current situation. Phytopathology 100:S17.

Phytophthora ramorum is a serious pathogen of trees and ornamental plants, causing a disease known as sudden oak death (SOD) in the U.S.A. Plants affected by *P. ramorum* show a range of symptoms including stem canker and tip dieback. *Phytophthora ramorum* was first detected Ireland in 2003. *Phytophthora ramorum* is reported to infect over 64 plant species, including a number which have significant commercial and amenity value in Ireland, particularly *Rhododendron* and *Viburnum* spp. The closely-related *P. kernoviae* causes similar symptoms to *P. ramorum* and was first discovered in the UK in 2003, New Zealand in 2006 and Ireland in 2009. To date *P. ramorum* and *P. kernoviae* have not been detected on tree species in Ireland, however there is strong concern that Irish trees could become infected. Extensive surveys have been carried out by the Department of Agriculture, Fisheries & Food (DAFF) from 2003 to present. Since 2003 nearly 6000 samples were collected around Ireland and *P. ramorum* was detected in all years: positive samples: 8% (2003), 2% (2004), 19% (2005), 10% (2006) & 16% (2007), 12% (2008) & 11% (2009)]. In 2003, *P. ramorum* was only found on *Rhododendron* and *Viburnum* spp., by 2009 the presence of *P. ramorum* was confirmed on six plant genera (*Rhododendron, Viburnum, Camellia, Photinia, Magnolia* and *Leucothoe*). *Phytophthora kernoviae* was first detected in Ireland in 2008 on *Rhododendron* spp. and confirmed in 2009. Eradication & containment measures are being implemented in accordance with EU legislation.

Goss, E.M. 2010. Inference of *Phytophthora ramorum* migration pathways. Phytopathology 100:S157.

Population genetic analysis can reveal important insights into the movement of plant pathogens, such as the connectivity of populations, migration events among geographic regions, and the tracing of new epidemics to an inoculum source. *Phytophthora ramorum*, the sudden oak death pathogen, was first detected in California and Europe in the early 1990's. The pathogen has caused extensive mortality to coast live oak and tanoak in coastal Northern California and has been costly to ornamental nurseries found to have *P. ramorum*-infected plants. Human activities have repeatedly contributed to the spread of this pathogen and long-distance migration of the pathogen is linked to the plant trade. Population genetic analysis has been integral to tracking its movement to date. Population genetic-based inferences on domestic and global *P. ramorum* migration events will be discussed.

Goss, E.M.; Larsen, M.; Vercauteren, A.; Werres, S.; Heungens, K.; and Grunwald, N.J. 2010. Genotypic diversity of *Phytophthora ramorum* in Canada. Phytopathology 100:S42.

Characterization of the genetic structure and diversity of the sudden oak death pathogen, *Phythophthora ramorum*, in ornamental nurseries in the United States has shown that all

three known clonal lineages of the pathogen are present. The most common clonal lineage in U.S. nurseries has been the NA1 clonal lineage, which has the wider distribution in the United States as a result of interstate shipments of infected nursery stock. British Columbia (BC), Canada is also known to have nursery infestations of *P. ramorum*, and shipments of infected plants between the United States and BC have occurred. We investigated the genotypic diversity of *P. ramorum* in BC nurseries and compared this population to U.S. and European nursery populations. All three of the *P. ramorum* clonal lineages were found among Canadian nursery isolates, but the most common was the NA2 lineage. The NA1 clonal lineage was found infrequently in comparison to the United States. The EU1 lineage was observed almost every year and shared multilocus genotypes with isolates from Europe and the United States. Appropriate markers for the characterization of the NA2 lineage are needed.

Grunwald, N.J. 2010. Population genetic insights into emergence of oomycete pathogens. Phytopathology 100:S150.

Oomycetes include notable pathogens that have repeatedly emerged as significant threats to plant biosecurity. Among these are for example the sudden oak death pathogen *Phytophthora ramorum* and the potato late blight pathogen *P. infestans*. Population genetic tools, whether based on molecular markers such as microsatellites or nucleic acid sequences, can provide unique insights into the evolutionary dynamics underlying invasion or emergence of Oomycete plant pathogens. Select examples of population genetic approaches used to understand the emergence of Oomycete pathogens will be presented and explored.

Hwang, J.; Jeffers, S.N.; and Oak, S.W. 2010. Aquatic habitats—A reservoir for population diversity in the genus *Phytophthora.* Phytopathology 100:S150.

Occurrences of oak decline and sudden oak death in forests of Europe and the west coast of the U.S.A., respectively, have focused attention on the species of *Phytophthora* present in natural ecosystems. We have been investigating the diversity of species of *Phytophthora* present in forest streams in the eastern U.S.A. *Phytophthora* spp. are well adapted to aquatic environments and can be recovered from stream water by baiting and filtration. Extensive surveys in multiple states revealed that a diversity of species occurs naturally in forest streams. In one study, five forest streams in western North Carolina were monitored monthly for a year. Seven species—*P. cambivora*, *P. cinnamomi*, *P. citricola*, *P. citrophthora*, *P. gonapodyides*, *P. heveae*, and *P. pseudosyringae*—and seven morphologically and genetically distinct groups of isolates were detected. Samples of stream-side soils and plants with symptoms also were collected, but only three species were detected: *P. cinnamomi* and *P. heveae* in soils and *P. citricola* and *P. heveae* on plants. Species of *Phytophthora* consistently were detected in streams during winter months when air temperatures were near or below freezing, which are not conducive to lesion development and sporulation. These results suggest that the native population of *Phytophthora* spp. in stream water is different from those in terrestrial habitats. The

species of *Phytophthora* present in streams may occupy a unique niche—i.e., they appear to be aquatic inhabitants and not transient visitors.

Kenney, M.J. 2010. USDA-APHIS plant pest permitting policy pertaining to containment facilities for plant pathogens. Phytopathology 100:S61.

The research community has interest in new and emerging plant diseases, agrobioterrorism, and exotic biocontrol organisms; research in these areas frequently must be conducted in containment facilities in order to safeguard American agriculture and the environment. The Animal and Plant Health Inspection Service (APHIS) recently implemented several new policies and standard conditions pertaining to the application, inspection, approval and maintenance of containment facilities. The level of biocontainment security required is based on risk of escape and possible establishment of plant pests. Containment facilities can consist of laboratories, growth chambers, and greenhouses, singly or combined. Containment facilities can be expensive to design, build, and maintain. APHIS provides assistance to permittees during this process; it also evaluates all containment facilities before permits are issued for pathogen research. Periodic re-evaluations are also required. Only a small percentage of the more than 2,000 APHIS-approved containment facilities are adequate to do work with high risk pathogens such as *Puccinia graminis* race UG99, *Phytophthora ramorum*, and plum pox virus. In addition, to ensuring that appropriate structural safeguards are established and maintained, there may be additional permits conditions that restrict the movement and use of plant pathogens.

Leonberger, A.J.; Speers, C.; Ruhl, G.; Creswell, T.; and Beckerman, J.; 2010. An Indiana survey of *Phytophthora* species in nurseries, greenhouses, and landscape plantings. Phytopathology 100:S69.

From 2006 to 2008, samples with symptoms consistent with *Phytophthora* blight and crown rot were collected as part of the USDA-APHIS *Phytophthora ramorum* nursery survey and submitted by additional outside sources to the Purdue Plant and Pest Diagnostic Laboratory. From 30 sites, 121 *Phytophthora* isolates were obtained from 1657 host samples containing 32 genera. Comparison of the internal transcribed spacer (ITS) sequence of the ribosomal DNA identified 9 *Phytophthora* sp. A majority of the isolates were either *P. citricola* (44.4%) or *P. citrophthora* (27.2%). *P. citricola* isolates were collected at 10 sites from 5 host genera, and included *Forsythia*, *Juglans*, *Pieris*, *Rhododendron*, and *Syringa*. *P. citrophthora* was isolated from 8 sites on 6 host genera: *Abies*, *Forsythia*, *Ilex*, *Pieris*, *Rhododendron*, and *Syringa*. The other identified *Phytophthora* sp. consisted of *P. cactorum*, *P. capsici*, *P. cryptogea*, *P. drechsleri*, *P. nicotianae*, *P. palmivora*, and *P. syringae*. Sixteen isolates showed signs of possible species hybridization. Four isolates were found to be hybrids of *P. cactorum* and *P. hedraiandra* as verified by cloning and sequencing the ITS sequences. Three of the *P. cactorum x hedraiandra* isolates came from *Rhododendron* plants at the same site. The other hybrid isolate was recovered from *Dicentra*, which is not a known host of either of

the parental species, *P. cactorum* or *P. hedraiandra,* and suggests an increase of host range due to species hybridization.

Rizzo, D. and Garbelotto, M. 2010. Sudden Oak Death and the future of California coastal forests. Phytopathology 100:S167.

Sudden oak death (SOD) is an emerging infectious forest disease caused by the recently discovered generalist pathogen *Phytophthora ramorum*. Lethal infections are concentrated in several ecologically important species, including tanoak (*Lithocarpus densiflorus*) and various oak species (*Quercus* spp.). The disease has killed potentially millions of trees in coastal forests of California and may be changing the ecological dynamics and biodiversity of these systems. Understanding the ecology of SOD and its long-term impacts on forests requires integrating knowledge of feedback among hosts, the pathogen and the environment. Which plant species will be successfully recruited in the face of SOD and how subsequent successional patterns will develop are important questions for forest managers and conservation biologists. Development of short-term and long term management strategies for SOD in California and Oregon coastal forests is still in the early stages. Options being tested include tree removals, fire, chemical treatments, and host resistance. These management strategies must be evaluated at different spatial scales and in context with long-term management goals and policies.

Schmidt, D. and Garbelotto, M. 2010. Efficacy of phosphonate treatments against Sudden Oak Death in tanoaks. Phytopathology 100:S115.

Pytophthora ramorum, the causal agent of Sudden Oak Death (SOD), has killed hundreds of thousands of trees in California and Oregon. Tanoaks (*Lithocarpus densiflorus*) are both stem and foliar hosts and, as such, die from SOD and help spread the disease. Phosphonate treatments are routinely used in agricultural and orchard crops affected by *Phytophthora* diseases. We have developed a detached-leaf bioassay for studying the effectiveness of phosphonate treatments for SOD in tanoaks. The assay involves infecting the petioles of tanoak leaves with agar plugs of *P. ramorum* in culture. SOD infection is analyzed by examining the spread of *P. ramorum* down the midrib of the leaf. This assay has shown that tanoaks in wildland settings, treated with phosphonates, are resistant to SOD infection. In addition, we are maintaining long-term studies of tanoaks treated with phosphonates in SOD infected forest areas. Paired 20mx20m treatment and control plots were established near existing SOD infections. The trees were evaluated for disease symptoms and general health prior to the initial treatment and each subsequent year. The results show that phosphonate treatments are effective at slowing and preventing the spread of the disease in the treated areas. Treatments at the leading edge of SOD infected areas were less effective, confirming that phosphonate treatments are significantly more effective as preventative rather than curative treatments.

Wang, S. and Garneni, S. 2010. Detection of *Phytophthora* species in retail nurseries and urban forest environments in northern Nevada. Phytopathology 100:S133.

To survey for *Phytophthora ramorum*, *P. kernoviae*, and other *Phytophthora* species in retail nurseries and urban forest environments, a total of 385 symptomatic plant samples were collected from 140 host species or varieties in 27 nurseries and 28 urban environments. To isolate *Phytophthora* species, fresh leaf tissue or phloem and xylem tissue was placed on the selective medium PARP. Isolates of *Phytophthora* were then transferred to corn meal agar and V8 juice agar for morphological identification. Molecular identification was employed by amplifying and sequencing an rDNA region containing partial 18S ribosomal RNA gene, ITS1, 5.8S ribosomal RNA gene, ITS2 and 28S ribosomal RNA gene. Of the total of 12 isolates obtained, 8 were from urban maple trees showing a bleeding canker symptom, and 4 were from plants showing leaf blight in retail nurseries. *P. cactorum* was predominantly associated with maple bleeding canker (88%), whereas *P. citricola* was found only from one maple tree. In nurseries, *P. cactorum* was found from Fraser's photinia, *P. citricola* from Red Robin cinquefoil, and *P. citrophthora* from both Canadale Gold euonymus and Vicary Golden privet. This survey suggests that *P. cactorum* is the major cause of chronic decline and death of maples in urban environments of northern Nevada and that nursery stock carrying various *Phytophthora* species is a direct pathway of introducing non-native pathogens into the urban forest environments.

Widmer, T.L.; Shishkoff, N.; and Dodge, S. 2010. Root susceptibility and inoculum production from roots of eastern oak species to *Phytophthora ramorum.* Phytopathology 100:S136.

Little is known about root susceptibility of eastern tree species to *Phytophthora ramorum*. In this study, we examined root susceptibility and inoculum production from roots. Roots of sprouted acorns for several eastern oak species were exposed to zoospore suspensions of 1, 10, 100, or 1000 zoospores per ml at 20°C. After 24 h, roots were removed, rinsed in water, planted in pots and placed in the greenhouse. After 4 weeks, the roots were surface sterilized and plated on PARPH+V8 medium. A root was recorded as positive if *P. ramorum* was observed on the medium. Infection of oak radicles occurred at a concentration as low as 1 zoospore per ml. Differences were observed among the species tested. To test inoculum production, the roots of oak seedlings were inoculated with sporangia, washed after 24 hr and transplanted into 2 × 2 inch pots containing Turface®. Periodically, 20-25 ml samples of runoff were collected from each pot and plated on PARPH; the resulting colonies were counted. Counts from oaks were compared to a positive control, *Viburnum tinus*, using regression analysis. Root segments were plated to calculate percent colonization. After 16 days, inoculum production from oak seedlings was variable and lower than *V. tinus*, as was colonization of roots. After 35-days, results were similar. This study shows that sprouted oak acorns are very susceptible to *P. ramorum* and may be important epidemiologically under natural environmental conditions.

RELATED RESEARCH

Ojiambo, P.S. and Scherm, H. 2010. Efficiency of adaptive cluster sampling for estimating plant disease incidence. Phytopathology 100:663-670.

Parnell, S.; Gottwald, T.R.; Gilligan, C.A.; Cunniffe, N.J.; and van den Bosch, F. 2010. The effect of landscape pattern on the optimal eradication zone of an invading epidemic. Phytopathology 100:638-644.

Pyšek, P.; Jarošík, V.; Hulme, P.E.; Kühn, I.; Wild, J.; Arianoutsou, M.; Bacher, S.; Chiron, F.; Didžiulis, V.; Essl, Franz; Genovesi, P.; Gherardi, F.; Hejda, M.; Kark, S.; Lambdon, P.W.; Desprez-Loustau, M.; Nentwig, W.; Pergl, J.; Poboljšaj, K.; Rabitsch, W.; Roques, A.; Roy, D.B.; Shirley, S.; Solarz, W.; Vilà, M.; and Winter, M. 2010. Disentangling the role of environmental and human pressures on biological invasions across Europe. Proceedings of the National Academy of Sciences of the United States of America. Online at http://www.pnas.org/content/early/2010/06/02/1002314107. DOI: 10.1073/pnas.1002314107.

The following 57 abstracts on related research topics are being presented at the 2010 APS Annual Meeting in Charlotte, NC, August 7-11th.

Abad, Z. 2010. How to avoid misidentifying your isolates: The value of the Morphological/Phylogenetic Key of *Phytophthora* extypes and neotypes. Phytopathology 100:S150.

Antolínez, C.A.; Danies, G.; Peña, G.; Vargas, Á.M.; Bernal, A.J.; and Restrepo, S. 2010. Biochemical and microscopical study of *Phytophthora infestans* process of infection on *Physalis Peruviana*. Phytopathology 100:S7.

Balci, Y. 2010. Ecological adaptations in *Phytophthora*. Understanding their role in forest ecosystems. Phytopathology 100:S151.

Camp, A.R.; Milgroom, M.G.; Meitz, J.C.; McLeod, A.; Fry, W.E.; McGrath, M.T.; Dillard, H.R.; and Smart, C.D. 2010. *Phytophthora capsici* in New York State: Resistance to mefenoxam and population structure. Phytopathology 100:S20.

Cárdenas, M.E.; Céspedes, M.C.; Bernal, A.J.; and Restrepo, S. 2010. *Phytophthora infestans* oospores: Production and viability in Colombia. Phytopathology 100:S21.

Céspedes, M.C.; Cárdenas, M.E.; Vargas A.M.; Bernal, A.J.; and S. Restrepo, S. 2010. Molecular and morphological characterization of a *Phytophthora infestans* population in the Colombian Andean region. Phytopathology 100:S22.

Danies, G.; Vargas, A.M.; Antolínez, C.A.; Peña, G.; Bernal, A.J.; and Restrepo, S. 2010. *Physalis peruviana* natural reservoir for *Phytophthora infestans* in the field. Phytopathology 100:S29.

Deahl, K. 2010. Science of the epidemic. Phytopathology 100:S161.

Del Castillo, J.M.; Bernal, A.J.; and Restrepo, S. 2010. Developing a taxonomic identification system based on microsatellites of *Phytophthora* species. Phytopathology 100:S29.

Donahoo, R.S. 2010 Response of late blight resistant tomato lines to Florida genotypes of *Phytophthora infestans*. Phytopathology 100:S30.

Enzenbacher, T.B. and Hausbeck, M.K. 2010. Isolates of *Phytophthora capsici* differ in their ability to cause disease on cucurbit fruits. Phytopathology 100:S34.

Fang, X.L.; Phillips, D.; Li, H.; Sivasithamparam, K.; and Barbetti, M. 2010. Fungal and oomycete pathogens associated with crown and root diseases of strawberry in Western Australia. Phytopathology 100:S35.

Garavito, M.F.; Garcia, L.; Lozano, G.L.; Bernal, A.J.; Zimmerman, B.H.; Restrepo, S. 2010. Expression and homology modeling of Dihydroorotate dehydrogenase from the phytopathogenic Oomycete *Phytophthora infestans*. Phytopathology 100:S39.

Gearhart, K.; Dugan, D.; Grimes, J.; Farley, L.; Fisher, J.; Burskey, C.; Dorrance, A.E. 2010 Survey of soybean diseases in the Ohio River Valley Region of Ohio during 2009. Phytopathology 100:S39.

Gobena, D.J.; Roig, J.; Hulvey, J.; and Lamour, K. 2010. Genetic diversity of the vegetable pathogen Phytophthora capsici in Argentina. Phytopathology 100:S41.

Granke, L.L. and Hausbeck, M.K. 2010. The effects of temperature, humidity, and wounding on development of Phytophthora rot of cucumber. Phytopathology 100:S43.

Halterman, D. and Chen, Y. 2010. Molecular interactions determining broad-spectrum partial late blight resistance in potato. Phytopathology 100:S46.

Hanson, S. and Peiman Williams, M. 2010. Study on the genetic diversity within *Phytophthora capsici* with nuclear, mitochondria and SNPs markers in New Mexico. Phytopathology 100:S47.

Hao, W. and C. Hong, C. 2010. Effect of temperature on survival of chlamydospores and oospores of *Phytophthora* species in irrigation water. Phytopathology 100:S47.

Haudenshield, J.S. and Hartman, G.L. 2010. A multiplexed, probe-based quantitative PCR assay for DNA of *Phytophthora sojae*. Phytopathology 100:S48.

Highland, H. 2010. MeloCon WG® and SoilGard 12G® used in a program as a methyl bromide alternative to control nematodes and soil borne diseases in vegetable production Phytopathology 100:S50.

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Hu, C.; Perez, F.G.; Donahoo, R.; McLeod, A.; Myers, K.L.; Ivors, K.L.; Roberts, P.D.; Fry, W.E.; Deah, K.L.; and Ristaino, J.B. 2010. Genetic structure of *Phytophthora infestans* population in eastern North America, 2002–2009. Phytopathology 100:S52.

Jackson, K.; Yin, J.; Csinos, A.; Scherm, H.; and Ji, P. 2010. Diversity of *Phytophthora capsici* from vegetable crops in Georgia. Phytopathology 100:S55.

Ji, P.; Yin, J.; Purvis, M.; Csinos, A.S.; and Newsom, L.J. 2010. A new fungicide for control of *Phytophthora capsici* on vegetable crops. Phytopathology 100:S57.

Kang, S. 2010. The *Phytophthora* Database: Current status and future directions. Phytopathology 100:S150.

Kelley, E. and Hao, J. 2010. Effect essential oils on inhibition of *Phytophthora capsici*. Phytopathology 100:S60.

Kim, S. 2010. Perspective of the crisis from the state regulatory inspection service. Phytopathology 100:S161.

Klappach, K. and Walker, K. 2010. Ametoctradin: A new Oomycete specific fungicide. Phytopathology 100:S63.

Kousik, C.S. and Thies, J.A. 2010. Response of U.S. bottle gourd (*Lagenaria siceraria*) plant introductions (PI) to crown rot caused by *Phytophthora capsici*. Phytopathology 100:S65.

Kunjeti, S.G.; Donofrio, N.M.; Marsh, A.G.; Meyers, B.C.; and Evans, T.A. 2010. Gene expressions of effectors in downy mildew of lima bean pathogen, *Phytophthora phaseoli*. Phytopathology 100:S66.

Lassiter, E.S.; Russ, C.; Nusbaum, C.; Zeng, Q.; Hu, C.; Thorne, J.; and Ristaino, J.B. 2010. Inferring evolutionary relationships of species in the *Phytophthora* Ic clade using nuclear and mitochondrial genes. Phytopathology 100:S68.

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COMTF WIDE MEETING

The 2010 Annual COMTF meeting, held June 8-11, 2010, was attended by over 120 people from 13 states, the United Kingdom, and Canada. Participant feedback to date has given high marks for the meeting location at Dominican University of California and the opportunity to tour the new National Ornamentals Research Site at Dominican University of California research facility. If you were in attendance and haven't already submitted

an evaluation, please consider doing so online at http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=4952. Your input will allow us to improve the next meeting.