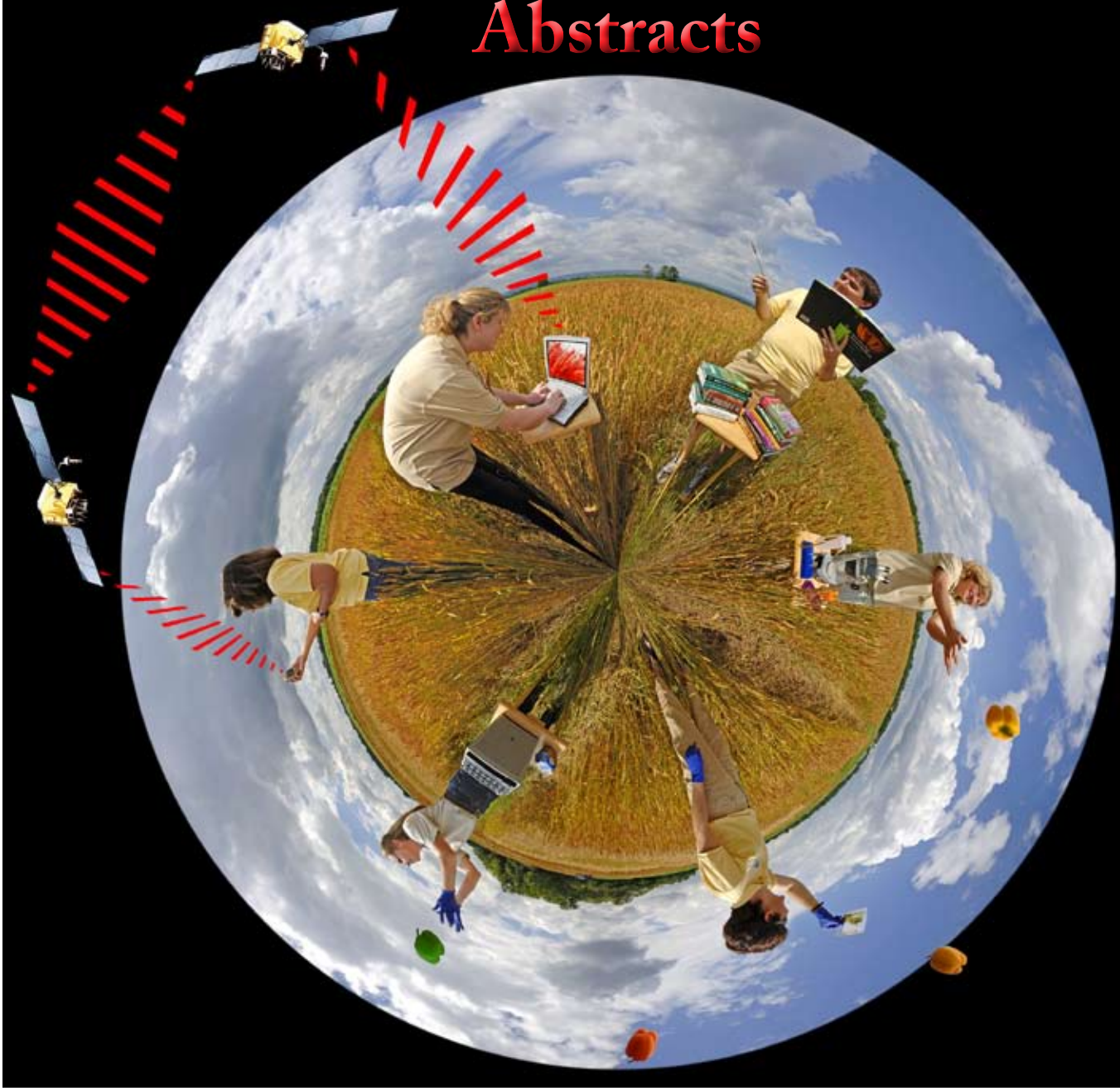
NPDN

National Plant Diagnostic Network

Diagnostics in the 21st Century

Second National Meeting
December 6-10, 2009 Miami, Florida

Abstracts



USDA GPDN Great Plains Diagnostic Network NCPDN North Central Plant Diagnostic Network NEPDN Northeast Plant Diagnostic Network SPDN Southern Plant Diagnostic Network WPDN Western Plant Diagnostic Network USDA

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Poster Viewing Schedule and Poster Titles by Category

Poster Viewing Hours

December 6, 2009

Poster Set-up ..... 12:00 – 5:00 p.m.
Poster Viewing ..... 7:00 – 9:00 p.m.

December 7, 2009

Poster Viewing ..... 10:00 a.m. – 7:00 p.m.

December 8, 2009

Poster Viewing ..... 10:00 a.m. – 7:00 p.m.
Poster Tear-down ..... 7:00 – 10:00 p.m.

Category	Poster Numbers
Diagnostic Identification Diagnostic Methods	P1 – P15
Information Technology	P16 – P21
Network Information	P22 – P35
New Pest Detections/State Updates	P36 – P61
Pest Eradication/Management	P62 – P63
Pest Surveys	P64 – P75
Training and Education	P76 – P89

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P-1 The rapid assay for the on-site detection of fire blight *Erwinia amylovora* (Ea)

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Erwinia amylovora (Ea), the causal agent of fire blight, represents a devastating quarantine pathogen affecting pome fruit trees and several ornamental plants. We describe the rapid on-site diagnostic BIOREBA AG Ea AgriStrip test based on the lateral flow immunochromatography technique. The BIOREBA AG Ea AgriStrip was developed and validated by Bioreba AG in cooperation with the Swiss Federal Research Station Agroscope ACW Fire Blight Disease Clinic. Specificity tests conducted in the laboratory and field comprised 73 different bacteria including 32 Ea strains from worldwide collections, other *Erwinia, Panthoea, Pseudomonas, Bacillus*, and other bacterial species. The BIOREBA AG Ea AgriStrip was shown to be highly specific (cross reactivity was only observed with *Erwinia pyrifoliae)*. The detection limit was 5 x 10^5 to 1 x 10^6 cfu/ml in pure cultures and spiked plant extracts. An agreement of 95-98 % was obtained when comparing 525 field samples in BIOREBA AG Ea AgriStrip with the standard plate isolation and serum agglutination methods. The BIOREBA AG Ea AgriStrip delivers results within 15 min, whereas the previous standard procedures required 48 h. The test can be performed by people without laboratory expertise. Due to its ease of use and validated reliability, the BIOREBA AG Ea AgriStrip has become a tool of plant inspectors for fast on-site Ea confirmation in symptomatic tissue, enabling immediate implementation of sanitary measures.

P-2 Molecular detection of *Phytophthora sojae* in *Glycine max* through conventional and real-time PCR

Bienapfl J.C.*, Percich, J.A., and Malvick, D.K. Department of Plant Pathology, University of Minnesota, St. Paul, MN, USA 55108.

Phytophthora rot, caused by *Phytophthora sojae*, is one of the most damaging diseases of soybean (*Glycine max*) in the U.S. However, this disease can be difficult to diagnose, and other *Phytophthora* species can also infect soybean in the Midwestern U.S. Accurate diagnosis is important for management of Phytophthora rot. The objective of this study was to evaluate PCR methods for rapid and specific detection of *P. sojae*. PCR assays using two sets of primers reported previously (PS1/PS2, Wang et al. 2006 and PSOJF1/PSOJR1, Hart 2004) that target the ITS region were evaluated to determine specificity to *P. sojae*. Genomic DNA extracted from 92 isolates representing 11 species of *Phytophthora* and 19 other species of soybean pathogens was used to test the specificity of each primer set. Conventional PCR results indicate that the PS primers amplify DNA from *P. sojae* as well as from three other *Phytophthora* species tested. Conventional and real-time PCR results using the PSOJ primers indicate these primers are specific for *P. sojae*. Conventional PCR with the PSOJ primers was also used to detect *P. sojae* in diseased soybean tissue and infested soil. The conventional and real-time PCR assays based on the PSOJ primers provide a rapid and sensitive tool for the detection of *P. sojae* as well as to distinguish *P. sojae* from other *Phytophthora* species.

P-3 Diagnostic and detection efforts of pests and diseases of *Jatropha curcas* L., the biodiesel plant

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In India, *Jatropha curcas* has gained importance commercially as a biodiesel plant and is being advocated for development of wastelands and dry lands. Apart from the suitability of its use as biodiesel (after transesterification), the seed oil is also reported to possess insecticidal, mollucicidal, fungicidal and nematicidal properties. The *Jatropha* crop is projected to have less pest damage and hence minimum requirement for plant protection. However, the toxicity and insecticidal properties of *J. curcas* are not deterrents for insects that cause economic damage in plantations as thought earlier. Several groups of insects have overcome this barrier in India when *J. curcas* is grown in continuous stretches as a monocrop as in the present study where, a plantation has been developed in the Botanical Experimental garden of the Department of Botany. As an ongoing study to develop diagnostics for pests and diseases of Jatropha, a thorough study was conducted and several pests and

diseases have been recorded from the plantation. The two insect pests that are emerging as a major problem in Jatropha cultivation are the scutellarid bug *Scutellera nobilis* Fabr. that causes flower fall, fruit abortion and malformation of seeds and *Pempelia morosalis* that causes webbing of inflorescence and capsule damage. The spider, *Stegodyphus* sp. also has been observed to cause damage. Several fungal pathogens have been identified as causing diseases on *Jatropha curcas* whole plant and seedlings, stem, leaves, and fruits. These diseases include: leafspots caused by *Thielaviopsis paradoxa, Curvularia* and *Cercospora* sp., seedling blight, anthracnose and fruit rot, and seedling stem rot. Some of these pathogens (*Thielaviopsis paradoxa, Colletorichum gloeosporioides,* and *Fusarium moniliforme*) also caused postharvest diseases on Jatropha fruits or nuts. Whitefly-transmitted geminiviruses of the genus *Begomovirus* are important pathogens of a wide range of crop ecosystems. Mosaic disease called the Jatropha Mosaic Virus (JMV) caused by whitefly-transmitted Gemini viruses of the genus *Begomovirus* was one of the diseases noticed recently. On the other hand, the following nematode genera were found associated with Jatropha plants: *Belonolaimus, Helicotylenchus* and *Meloidogyne.*

P-4 Using molecular methods in the Plant Disease and Insect Diagnostic Laboratory at Oklahoma State University

Dominiak-Olson, J.D.*, Olson, B.R., and Grantham, R.A. Oklahoma State University, Stillwater, OK

In 2004, the Plant Disease and Insect Diagnostic Laboratory began using molecular methods to detect plant pathogens. We routinely test samples using the polymerase chain reaction (PCR) technique for plant pathogen detection and insect differentiation. Plant pathogens and insects are identified using direct DNA sequence analysis of select genes. Our laboratory employs conventional PCR, real-time PCR (qPCR), immunocapture PCR, and reverse-transcriptase PCR for the detection of plant pathogens, arthropods and insects. We frequently use DNA sequence analysis to verify PCR results. We have standard operating procedures (SOPs) for more than 30 viruses, 10 bacteria, 12 fungi and 8 invertebrates (nematodes, insects). Most molecular SOPs were derived from previously published materials and methods and have been validated in-house for use in diagnostic testing. Molecular methods allow us to more accurately and quickly identify the cause of many plant problems.

P-5 Development of systematic microarrays for broad spectrum plant virus detection

Fauquet, C.H.*, and ILTAB/ Danforth, D. Plant Science Center, St. Louis, MO

Effective quarantine measures are essential to prevent the introduction and spread of potentially devastating plant pathogens. DNA microarray methods based on oligonucleotide probes offer cheap, rapid, reliable, and parallel detection of plant pathogens including viruses. Previous diagnostic microarray systems focused on a single crop or family of plant viruses. Our preliminary data with a prototype broad range plant virus chip containing 70-mer oligonuleotide probes specific to species and genera, suggested the prospect of a broad range plant virus chip with probes for every taxon of the taxonomic tree. The design of oligonucleotide probes on the taxonomic principles greatly helps not only detection/identification but also classification of known or new viruses. Using 16S rDNA and a few housekeeping genes like *rpsA*, taxonomic arrays have been developed for bacteria. But, unlike bacteria and fungi, viruses don't have universally conserved sequences for all the members. Here we report the design of taxonomy based broad range plant virus oligonucleotide microarray. Using a multi-tiered algorithm that selects both highly conserved and specific sequences, we are designing multiple 60-mer probes for every taxon/node of the taxonomic tree for each of the plant virus sequence available in the NCBI gene bank. Robust computational strategy will be used for objectively interpreting the resultant hybridization pattern data in an automated fashion.

P-6 Validation of commercially available serological tests for *Clavibacter michiganensis* subsp. *nebraskensis*, cause of Goss's bacterial wilt and blight

K.A. Korus*, A.D. Ziems, A.K. Vidaver, T.A. Jackson; Dept. of Plant Pathology, University of Nebraska, Lincoln, Nebraska

Goss's wilt and blight of corn, caused by the bacterium *Clavibacter michiganensis* (Cm) subsp. *nebraskensis* (Cmn), is currently diagnosed by symptom identification and successful isolation onto CNS selective medium. An ELISA test kit and ImmunoStrips (Agdia®) specific to Cm *michiganensis* (Cmm) reportedly gives a cross-reaction with Cm subspecies. These tests would provide a quick and inexpensive method for diagnosis of Cmn but have not been previously validated. ELISA test kits were provided by Agdia specific to Cmm, Cm *tessellarius* (Cmt), and Cm *sepedonicus* (Cms), respectively, and ImmunoStrips specific to Cmm. Also, an

ELISA test kit (Neogen®) specific to Cmn was included in the study. For each test kit 13 strains of Cmn and 40 symptomatic leaf samples submitted from widely dispersed commercial corn fields to the UNL Plant & Pest Diagnostic Clinic were tested. All ELISA test kits, except those for Cms, consistently gave positive results for all 40 infected leaf samples. Cmn was confirmed in the leaf samples with Koch's postulates. When testing cultures, both the Cmm and Cms specific ELISAs gave consistent positive and negative results, respectively. ImmunoStrips for Cmm consistently tested positive for cultures of all the subspecies and plant samples infected with Cmn. ELISAs using antibodies specific to Cmm, Cmn and Cmt and ImmunoStrips using antibodies specific to Cmm can be used reliably when testing for the presence of Cmn.

P-7 Insect and plant disease diagnostics at the Hawaii Department of Agriculture

Kumashiro, B.R.*, and Ko, M.P. Plant Pest Control Branch, Hawaii Department of Agriculture, Honolulu, HI and Brian Bushe and Scot C. Nelson, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Hilo, HI

The Hawaii Department of Agriculture, Plant Pest Control Branch, has a staff of five involved in the diagnostics of insects and plant diseases- three in the Insect Taxonomy Unit and two in the Plant Pathology Unit. Hundreds of identifications are processed through the two diagnostic units. Most of the identifications are done in-house with available resources, but local authorities are consulted within the state for difficult identifications. The Systematic Entomology Laboratory in Beltsville, MD is also often utilized for insect determinations. In events where identifications are of great concern to Hawaii or US agriculture, the NPDN diagnostic protocol has been followed. Thus far this process has been used for the determination and notification of the Asian Citrus Psyllid and the Raspberry Late Leaf Rust. The latter is being used as an example in this poster, describing the multiple steps of a modified NPDN protocol that led from the initial collection of raspberry rust samples at a farm in the Hilo district, Hawaii, to the eventual confirmation of the rust as *Pucciniastrum americanum* by the scientists at the USDA/APHIS/PPQ National Identification Services.

P-8 On the horizon: A Lucid matrix-based key for rapid and stream-lined preliminary identifications of major endemic and exotic arthropod pests of U.S. citrus

Martin, K.W.*, Hodges, A., Leppla, N.C., and Walters, T. Department of Entomology and Nematology, University of Florida, Gainesville FL; USDA-APHIS-PPQ-CPHST, Fort Collins, CO

The citrus industry in all parts of the United States is struggling to cope with numerous arthropod pests and vectors that threaten the financial viability of citrus production. Field inspectors, survey specialists, county Extension agents and diagnosticians are tasked to both accurately and rapidly identify endemic pests while simultaneously screening samples for introduced "high-consequence" insect pests e.g., Old World bollworm *Helicoverpa armigera* (Hubner) (USDA, APHIS, Analytic Hierarchy Process (AHP) Prioritized Pest List for FY 2010). Traditional dichotomous keys are written for subject matter experts and usually require highly specialized knowledge to be utilized effectively. This limits their usefulness for non-scientists and can potentially delay crucial insect identifications. This Lucid key will contain comprehensive yet easily understood taxonomic descriptions, along with step-by-step guidance that will enable a user to rapidly screen arthropods and make presumptive identifications of known and exotic major citrus pests. Fact sheets developed to augment the key will provide rapid access to information on the life history, hosts and related characteristics of pests that may prove useful for making pest management decisions.

P-9 Phylogenetic analysis of *Rhizoctonia solani* using rDNA-ITS sequences – an alternate tool for identification of anastomosis groups

Mathew, F.M.*, Botschner, M., Lamppa, R.S., Markell, S.G., and Goswami, R. S., Dept of Plant Pathology, North Dakota State University, Fargo, ND

Rhizoctonia solani Kühn (teleomorph = *Thanatephorus cucumeris* Frank (Donk)) is a soil-borne fungus capable of causing diseases on field and horticultural crops. This species can be separated by hyphal anastomosis reaction into at least twelve anastomosis groups (AGs), which often share traits such as virulence and host range. Traditionally, vegetative hyphal fusion with tester isolates of each AG group was used for identifying *R. solani* AGs and their subgroups. Recently, the availability of *R. solani* sequences in public databases has enabled use of molecular analyses for AG grouping. The goal of this study was to develop a quick and reliable method of

assigning AG groups to *R. solani* isolates based on phylogenetic analysis of their ribosomal DNA -internal transcribed spacer (rDNA-ITS) sequences. A portion of the rDNA-ITS region from seventy *R. solani* isolates obtained from seven field crops were PCR amplified using ITS 4 and 5 primers and sequenced. The sequences were aligned with other known multinucleate *R. solani* sequences from the NCBI GenBank. Anastomosis groups were separated by phylogenetic trees generated from distance and parsimony analysis and validated using hyphal fusion. This technique can serve as a convenient diagnostic tool, and may be particularly useful when tester isolates are unavailable or AG groups can not be identified using hyphal fusion.

P-10 Importance of using an additional control, a "spike" sample when using real-time PCR

McBride, S.M.*, Lindley, L. and Ong, K. Texas Plant Disease Diagnostic Laboratory, Texas AgriLife Extension Service, Department Plant Pathology and Microbiology, Texas A&M University, Undergraduate in Bioenvironmental Science at Texas A& M University, Department of Plant Pathology and Microbiology

In a diagnostic laboratory, time is of the essence. Real-time PCR is a tool that can be used effectively to rapidly detect plant pathogens. Schaad etal, demonstrated using this tool in the detection of Xylella fastidiosa, in asymptomatic grape vines. We attempted to shorten the procedure by utilizing Agdia's plant extraction maceration kit and used the plant tissue extract directly in real-time PCR. In addition, plant tissue extraction was purified with Qiagen's DNeasy kit and subject to real-time PCR. A comparison of real-time amplification of the "crude" sample and the purified sample from Oleander leaf tissue exhibiting scorch symptoms indicated an undetermined component, either from the plant tissue or the extraction buffer had interfered with the ability to amplify the targeted DNA of Xylella fastidiosa. Our results indicate the importance of incorporating Xylella DNA as a "spike" sample in addition to positive and negative controls when running real-time PCR to detect potential interferences to amplification. Quantitative Real-Time PCR was also used to show differences between two Oleander leaf tissue samples showing different levels of bacterial infection from two different locations in Brazos County, Texas.

P- 11 A case of clinic collaboration concerning climate and corn

Osborne, L.E., Chase, T.E., Tande, C.A.*, Berg, R.K., Ruden, B.R., and Todey, D.P. Plant Science Department, South Dakota State University, Brookings, SD

In the fall of 2007, elevated mycotoxin levels in corn were reported to personnel at South Dakota State University. The main concern was aflatoxin, produced by *Apergillus* spp., and several toxins produced by *Fusarium* spp. including vomitoxin, fumonisins and zearlenone. Soon after, an effort was established to determine the extent of the potential problem. Research scientists, extension personnel and diagnostic clinic staff worked closely together to identify and obtain the equipment necessary to respond and thus established the infrastructure to perform reliable, semi-quantitative ELISA-based analysis of corn samples for four major mycotoxins. Funding for a Romer Series II Mill and Charm Sciences ROSA-M mycotoxin testing system was obtained through cooperation with the S.D. Corn Utilization Council. Following this initial work, a multi-disciplinary research team was established and continues to investigate climate, insects and mycotoxin development in SD corn. It was determined that an intense period of mid-summer drought (i.e., July) followed by a very wet August was the primary environmental variable that impacted mycotoxin levels in 2007. The equipment and knowledge base established in the clinic because of this event are now available and readily used for rapid diagnosis and response to the industry when these food safety and animal health issues arise in the state.

P-12 A Lucid key to the common *Phytophthora* species

Ristaino, J.B.*, and Hu, C. Department of Plant Pathology, North Carolina State University, Raleigh, NC

The Key to the Common Phytophthora species (Lucid v 3.4) is a matrix-based computerized identification key and includes important morphological and molecular characters that are useful for identification of 54 species. A set of features and character states are used to make a correct species identification of an unknown culture. The user enters responses to known feature state options into Lucid Player and the correct species is identified. Illustrations of feature state options are included where applicable in the key and a glossary of terms to guide the user is included in the fact sheets. The main features included in the key are: asexual structures, sexual structures, chlamydospores, hyphae and cultural characteristics, temperature requirements, and host pathogenicity. The user can read an illustrated "Fact Sheet" on each species of interest. A cross-linked glossary of terminology is included

in the "Fact sheets". In addition, a FASTA file of the ITS and Barcode of Life (5' end of the *cox1* gene) sequence for each species is attached in a file. The key was created to help provide individuals with easily accessible tools to distinguish species based on a number of important morphological and molecular characteristics and will be available from APS Press.

P-13 Multiplex PCR with three Kansas viruses

Ryba-White, M., Schrum, E.*, and O'Mara, J. Department of Plant Pathology, Kansas State University, Manhattan, KS

Current methods in the KSU Plant Diagnostic Lab for detecting viruses in wheat include visual assessment for disease symptoms and serological methods, ie ELISA. The most common viral diseases that occur in Kansas are *wheat streak mosaic* (WSMV), *high plains* (*HPV*) and *triticum mosaic* (*TriMV*). PCR diagnostics is a convenient tool when detecting minute amounts of virus in diagnostic samples. We participated in the GPDN Wheat Virus Survey which utilized ELISA testing for analysis of presence or absence of the three viruses in wheat tissue. 2009 saw a low incidence of *trimv* in Kansas as compared to the surrounding states of Nebraska, Oklahoma and Texas. Our goal was to develop a simple and quick PCR screen to test for these three viruses. This would allow us to improve our confidence levels. Here, we report the development of a novel primer that when combined with HPV and WSMV primers create a PCR multiplex. Confirmation of validity was performed on wheat samples from the last 4 years.

P-14 Implementation of nucleic acid-based pathogen detection in the University of Kentucky Plant Diagnostics Program

Vincelli, P*, Amsden, B., and Beale, J. Department of Plant Pathology, University of Kentucky, Lexington, KY

Since 2003, we have adopted an increasing number of PCR-based protocols for pathogen detection into our plant diagnostics program. Currently we have a total of 18 protocols (all adapted from published primers) that will detect viruses, bacteria, fungi, and nematodes that are difficult or time-consuming to positively identify. Several of these protocols use conserved primers that amplify taxa above the rank of species, which can be combined with direct sequencing in order to identify pathogen species. For example, we use a semi-nested PCR for *Phytophthora* species in diseased plant tissues, and the resulting amplicon is gel-purified and sequenced to determine the species present. DNA-based pathogen detection tools present obvious advantages, including high specificity, high sensitivity, and in some cases, more rapid results than can be obtained than by other laboratory techniques. However, implementation of these tools is itself time-consuming and costly. Therefore, in a diagnostic setting, we use DNA-based tools very selectively. Most of our diagnoses still rely on simpler and more robust laboratory techniques, including microscopy and the use of commercial ELISA kits.

P-15 Use of DNA sequences and bioinformatic tools as standard diagnostic procedures for regulatory or fastidious plant pathogens

Garneni, S., and Wang, S.*, State Plant Pathology Laboratory, Nevada Department of Agriculture, Sparks, Nevada

Diagnosis of plant diseases involves identification of the causative agent and further determination of the identity of the agent. The accuracy of plant diagnostics requires appropriate laboratory procedures. The plant pathology laboratory at Nevada Department of Agriculture provides diagnostic services to state-wide clientele and tests plants for all groups of plant pathogens. In addition to standard microscopic examination, ELISA and PCR are routinely employed for diagnosis. We have established a DNA sequence-based diagnostic approach to identify regulatory or fastidious plant pathogens. This approach includes DNA extraction, PCR amplification of specific DNA fragment, cloning, sequencing, and further bioinformatic analysis. This approach was successfully used to identify *Fusarium oxysporum* f.sp. c*anariensis*, a pathogen causing Canary Island date palm wilt disease, and various *Phytophthora* species. This technique also provides a powerful tool to detect fastidious plant pathogens such as Phytoplasmas, *Candidatus* Liberibacter asiaticus, and *Xylella fastidiosa*. When it was used in the diagnosis of ash yellow and dieback syndrome in southern Nevada, we found that certain primers reported by others for detection of ash yellow phytoplasma generated false positive PCR fragments based on their DNA

sequences. The DNA sequence-based approach forms an essential component to achieve accurate and reliable diagnostics.

CATEGORY: INFORMATION TECHNOLOGY

P-16 IT Committee: Addressing the current and future needs of the NPDN network

Hill, M.*, Barber, D., Beck, H., Coggeshall, A., Dabade, S., Dizon, J., Duynslager, L., Luke, E., Miller, K., Mitra, C., Scott, K., and Thomas, C. Purdue University, West Lafayette, Indiana

The NPDN IT Network is a complex distributed system that manages and disseminates diagnostic information to appropriate audiences. The IT committee, which includes representation from all five NPDN regions, works collaboratively to address the IT needs of the network. A core function of the IT committee is dedicated to developing secure and reliable applications for assessing and communicating critical information. The regional and national databases are an indicator of our success with the increase in the number of samples being uploaded over the years along with the continued improvement in the quality of the data. As technology evolves the IT committee will strive to incorporate innovative solutions to improve the users' overall experience.

P-17 Development of "how to scout" videos for invasive species and economic pests

Hummel, N.A., Ferrin, D., Gautreaux, C., and Pollet, D.*, Louisiana State University Agricultural Center, Department of Entomology; Department of Plant Pathology and Crop Physiology

The panicle rice mite, *Steneotarsonemus spinki*, was detected in Louisiana in 2007. In response to its detection, the United States Department of Agriculture and the Louisiana Department of Agriculture and Forestry conducted a delimited survey and established quarantines to limit the spread of this pest. One of the challenges posed when responding to the detection of this pest was training consultants, farmers, surveyors, and county agents to detect and properly identify this pest. A "how to scout" video was produced and posted online, as well as presented at winter production meetings, consultant trainings and county agent trainings. Subsequently, "how to scout" videos were developed on the following topics: 1) Asian citrus psyllid and greening disease, 2) the rice water weevil, 3) colaspis in rice, 4) citrus leafminer, and 5) diaprepes root weevil. The videos were prepared when filming for news stories and then edited by the communication specialist with assistance from the extension specialist. These videos have been very well-received by the public and provide a valuable educational tool. The long-term goal is to develop a complete series of videos on the invertebrates that attack rice, citrus, and other agricultural commodities. Videos are posted on www.lsuagcenter.com and YouTube.

P-18 Developing the Diagnostician's Cookbook and the Plant Pathogen Media Gallery

LaForest, J.*, and Harmon, C.L. Center for Invasive Species and Ecosystem Health-the Bugwood Network, University of Georgia, Tifton, GA; Department of Plant Pathology, University of Florida, Gainesville FL

Plant diagnosticians need a reliable source of media recipes and test procedures for diagnosing plant diseases as well as images of how various microorganisms respond to these protocols. Although several diagnostic labs within the National Plant Diagnostic Network (NPDN) have created their own "cookbooks", there has not been a central repository for this information. The Diagnostician's Cookbook (http://wiki.bugwood.org/ Diagnosticians_cookbook) has been created to assist in compiling a standard diagnostic reference. All diagnosticians are invited to contribute protocols to this resource and comment on the recipes already listed. The NPDN Diagnostics Committee will be vetting the materials and marking those items they feel should be included in the NPDN Standard. To provide illustration to accompany this guide, the Center for Invasive Species and Ecosystem Health at the University of Georgia (Bugwood Network) is creating the Plant Pathogen Media Gallery. This will allow users to select a media and view all images of different fungi on that media. The user can filter the images to view only images of asexual spores, sexual spores, or the general culture. As part of a USDA-Regional IPM grant through the Southern IPM Center, University of Florida will be contributing images of fungi on media with information such as growing temperature and growing duration. If you wish to help by contributing to either of these resources, please contact Joe LaForest at LaForest@uga.edu.

P-19 Web resources for widely prevalent plant pathogens in the United States and territories

LaForest, J.*, White, J. L., Harmon, C.L., Stiles, C.M., Valverde, R.A., Sundin, G.W., George W. Bird, G.W., and Huettel, R.N. Center for Invasive Species and Ecosystem Health-the Bugwood Network, University of Georgia, Tifton, GA; USDA APHIS PPQ Plant Health Programs, Riverdale, MD; Department of Plant Pathology, University of Florida, Gainesville FL; Biology, Georgia Military College, Valdosta, GA; Dept of Plant Pathology and Crop Physiology, Louisiana State University AgCenter, Baton Rouge, LA; Department of Plant Pathology, Michigan State University, East Lansing, MI; Department of Entomology, Michigan State University, East Lansing, MI; Department of Entomology and Plant Pathology, Auburn University, AL

Determining what plant pathogens are considered widely prevalent and sharing that information with others is a daunting task. Widely prevalent plant pathogen lists are necessary to help State Plant Regulatory Officers determine which cultures may receive expedited permitting for laboratory use and what real-time diagnostic data may be shared between states. USDA APHIS partnered with the American Phytopathological Society (APS) to determine the plant pathogenic organisms considered widely prevalent in each of the US states and territories. Committees were formed within APS to focus on creating lists for fungi, bacteria, viruses, and nematodes. After creating their lists, committees partnered with the Center for Invasive Species and Ecosystem Health at the University of Georgia (Bugwood Network) to create websites to display the information. Three of the four lists have been completed and can be viewed at their respective websites: www.PrevalentFungi.org, www.PrevalentViruses.org, www.PrevalentBacteria.org. Although these websites are publicly available, they also contain a password-protected section to allow the committee members to add and remove species from the list. Future plans for the sites include the recruitment of images to better illustrate organisms on a state's widely prevalent list.

P-20 Utah Plant Pest Diagnostic Lab programs and affiliates

Murray, M.S.*, Davis, R., Alston, D., Utah State University, Logan, UT

The Utah Plant Pest Diagnostic Lab (UPPDL), established as individual insect and disease clinics more than 20 years ago, has, in the past four years, undergone several changes. The two clinics were combined to form a cohesive unit in a central lab, and given the new title. A dedicated marketing and legislative lobbying effort brought public recognition to the Lab as well as ongoing state funding. The Lab coordinates First Detector training, and has, through WPDN and state funding, provided dissecting microscopes with imaging technology to each county Extension office in the State. This "distance diagnostics" feature, enhanced by in-service agent training, has improved local response to pest ID. This feature, along with interaction with the Utah Department of Agriculture (UDAF), helped the Lab to quickly identify a new introduction to the state, the red fire bug (*Pyrrhocoris apterus)*. Along with UDAF, the UPPDL also interfaces with the Utah IPM program, which includes a pest advisory system, and with the Cooperative Agriculture Pest Survey program, conducting surveys of state and national concern.

P-21 New NPDN Web Site Portal

Scott, K.A.*, Coggeshall, A., Harmon, C.L., Luke, E., Snover-Clift, K., Duynslager, L., LaForest, J., Thomas, C., Dobesh, S., and Hill, M., Cornell University, NEPDN Regional Center, Ithaca, NY, University of California, Davis, WPDN Regional Center, Davis, CA, University of Florida, SPDN Regional Center, Gainesville, FL, CERIS-National Repository, Purdue University, West Lafayette, IN, Michigan State University, NCPDN Regional Center, East Lansing, MI, University of Georgia, SPDN, Athens, GA, Kansas State University, GPDN Regional Center, Manhattan, KS.

A new portal for the National Plant Diagnostic Network web site (www.npdn.org) has been developed using an open source content management system. The site offers new features for both visitors and administrators of the site. The new site will better serve the public and registered users by monitoring usage reports that will let administrators know what pages are visited most often. It provides the chairmen of the sub-committees easier access to posting and maintaining committee activities, meeting minutes, and network documentation. It also provides valuable tools and resources for First Detectors, Information Technologists, Diagnosticians, stakeholders and network partners. Regional web sites will be phased in over the next several months. The new portal is housed at Purdue University in West Lafayette, Indiana and will soon have off site back up capabilities to help

facilitate minimal down time due to environmental issues or hardware failure. Screenshots of the new web site will be shown on this poster with highlights and locations of new and important information.

CATEGORY: NETWORK INFORMATION

P-22 GPDN in Colorado

Blunt, T.*, Tisserat, T., Camper, M., Edmunds, B., Small, M., Utley, C., and Swift, C. Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO, Colorado State University Extension, Adams County, Brighton, CO, Colorado State University Extension, Jefferson County, Golden, CO, Colorado State University Extension, Mesa County, Grand Junction, CO

The National Plant Diagnostic Network was formed in response to the threat of bio-terrorism and to orchestrate the flow of information between diagnosticians and regulatory agencies. The NPDN is divided into five regions, Northeast, North Central, Southern, Great Plains and Western regions. The Plant Identification and Diagnostic Clinic located at Colorado State University is a member of the Great Plains Region. Under the umbrella of the Colorado State University Campus Plant Identification and Diagnostic Clinic are three regional diagnostic clinics with individual areas of expertise. One clinic is the Jefferson County Diagnostic Clinic serving Denver and surrounding suburbs addressing primarily urban homeowner issues. Another is the Adams County Diagnostic Clinic primarily serving the greenhouse and nursery industries in Colorado and finally we have the Tri-River Area Diagnostic Clinic serving the needs of the Western Slope of Colorado with its unique environment. Each diagnostic clinic has the ability to utilize the web-based Plant Diagnostic Information System (PDIS) for record-keeping purposes as well as a microscopic camera system. We would like to report on each diagnostic clinic and how they are an invaluable part of the GPDN.

P-23 The Western Plant Diagnostic Network Regional Center Update

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The WPDN is comprised of plant pest, weed and pathogen detection specialists in the ten-state western region of the United States, including U.S. territories in the Pacific. The University of California, Davis, in collaboration with the Plant Pest Diagnostics Center of the California Department of Food and Agriculture (CDFA) in Sacramento, serves as the regional center of the WPDN, providing training, guidance, and sample diagnosis for the region, as well as back-up for the four other NPDN regional centers. The Oregon State University and the Hawaii Department of Agriculture/ University of Hawaii together provide sentinel lab support for the Pacific Northwest and the Pacific Islands, respectively. The WPDN regional repository was the first to become phase 2 compliant and has uploaded over 63,000 samples to the National NPDN Repository. During the last 2 years, there have been over 40 diagnosed first occurrences in the region. Richard Hoenisch (WPDN) with Amanda Hodges (SPDN), Karen Rane (NEPDN), and Joel Floyd (USDA) coordinated two NPDN-USDA-APHIS Adult Lepidopteran Identification Workshops in 2009, each with about 30 attendees. The WPDN has taken the lead, along with the GPDN and CERIS, in launching the NPDN Epidemiology Effort for analysis of data in the NPDN Repository at CERIS, Purdue. Another growth area for WPDN is the first detector program, which has trained over 4,000 first detectors to date, including over 222 that have conducted at least one module on-line.

P-24 The Southern Plant Diagnostic Network in Puerto Rico: Accomplishments and perspectives

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The Southern Plant Diagnostic Network has an exceptionally important role in Puerto Rico through the Plant Disease Clinic in Juana Diaz Substation. The Clinic is a facility of the Crops and Environmental Science Department and provides diagnosis to commercial growers, seed companies, extension educators, researchers and homeowners. The Clinic opened in February 2005 and is located in the south west vegetable-producing area. The purpose of the Clinic is to provide an accurate and rapid diagnosis to ensure a better opportunity for the grower to manage pests and diseases. The Clinic is a network with the DDIS (Digital Diagnostic Information Systems) linked to the University of Florida Specialists. The Clinic has adopted standard operation procedures for disease diagnostics and has implemented molecular diagnostics. The Disease Clinic is part of the certification process for

corn, soybeans, sunflower, rice, wheat, barley, cotton and sorghum for the winter nurseries of 7 different seed companies in Puerto Rico. In 2008-2009, a total of 2,809 determinations were conducted of 469 samples submitted. One hundred and thirty-eight different fungal pathogens of major crops were sequenced and identified. Twenty six different sequences of fungal identifications were submitted to GenBank. Approximately, 200 visits of growers, extension educators and seed companies were registered at the Disease Clinic. In the same year, six refereed articles and five abstracts were published. The Clinic also conducts trainings for diagnosis of diseases of major crops on the island. Diagnostic laboratory accreditation is planned in short term.

P-25 NPDN: Strengthening partnerships through exercises

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An important component of preparedness is practice prior to an emergency. By working closely with critical programs and agencies in planning and conducting joint exercises, the NPDN exercise committee has significantly strengthened the vital partnerships necessary for the successful resolution of plant disease and pest outbreaks. Since 2007, the NPDN, USDA APHIS and State Departments of Agriculture (SDA's) have conducted 8 joint exercises using an NPDN exercise as the trigger for a full scale Incident Command System activation. Evidence of the effectiveness and importance of the exercise program is provided by the fact that several states detected the exercised pests during shortly after the exercise: e.g., Emerald Ash Borer in PA, sirex wood wasp in NJ, and mediteranian fruit fly in FL. Exercise participants stated the exercises were helpful in preparing for actual events. The NPDN, the National Institute of Microbial Forensics & Food and Agricultural Biosecurity (NIMFFAB), APHIS and SDA's have worked closely in planning and implementing a series of criminal intent scenario exercises; in hosted by NIMFFAB in OK. The NPDN, APHIS, SDA's and NM partnered in exercises to engage states and federal partners on the Mexico-US border. The NPDN launched an on-line exercise module for the online first detector training program in April, 2008; completed by over152 first detectors. Exercises strengthened our ability to effectively process suspect samples through the NPDN.

P-26 The National Institute for Microbial Forensics & Food and Agricultural Biosecurity: Forensic plant pathology in action

Fletcher, J.*, Wayadande, A., and Ochoa Corona, F. Oklahoma State University; Stillwater, OK

The National Institute for Microbial Forensics & Food and Agricultural Biosecurity (NIMFFAB**)** a multidisciplinary team of faculty and students, addresses multiple facets of agricultural biosecurity, food security, and forensic science. Its mission is to *build on, connect and enhance existing programs to address issues of crop and food biosecurity, and their impacts on people and national and regional economies.* NIMFFAB assesses capabilities in forensic plant pathology; provides strategic planning and prioritization of needs and resources; fosters and performs cooperative research on crop and food safety forensics issues; serves as a bridge between the plant pathology and law enforcement/security communities; and offers education and training opportunities. NIMFFAB is a resource for both the plant pathology community and Federal agencies; a "spoke" linkage with DHS's National Bioforensic Analysis Center supports research adapting forensic assays to phytopathogen systems. A collaboration with the FBI and others focuses on the Microbial Rosetta Stone, an information database on high-threat pathogens. Other NIMFFAB research addresses phytopathogen strain differentiation in forensic investigations, forensic diagnostics, interactions of human pathogens on plants and insects, and traceback of human pathogens to possible point sources. NIMFFAB also provides outreach, hosting interactive exercises enhancing US plant pathogen forensics capability and interactions among agencies.

P-27 The North Central Plant Diagnostic Network

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The North Central Plant Diagnostic Network is comprised of plant pest and pathogen detection specialists in the eight-state North Central Region of the United States. The NCPDN region is noted for high agricultural activity across all of the states in the region. Nearly 60% of all US corn and soybean production comes from NCPDN states, and, in total, the region accounts for nearly 24% of all major field crops produced in the US. The NCPDN states also have extensive specialty crop production, with a significant portion of US tart cherry, asparagus, pumpkin and picking cucumber production residing in these eight states. Activities of the NCPDN such as diagnostic capacity enhancement, types of hands-on training at regional meetings, diagnostic sample submission, first reports of pathogens and pests, and results of training activities will be highlighted.

P-28 The Southern Plant Diagnostic Network: Fourteen states and territories working to safeguard agriculture in the SE US and the Caribbean

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The Southern Plant Diagnostic Network comprises plant pest and pathogen detection specialists in 12 states and two territories of the United States. The SPDN region is noted for diverse agricultural activity across all of the states in the region, representing tropical, subtropical and temperate climates. Activities of the SPDN include diagnostic capacity enhancement, regional meeting activities, diagnostic sample submissions and training activities. States and territories in the SPDN have had numerous state and regional first reports, have conducted training for hundreds of First Detectors, and have enhanced diagnostic capacity in the region since the 2007 meeting. Some of the capacity-building activities in the region have included diagnostician training at USDA-APHIS-CPHST facilities, incorporation of new laboratory techniques and instrumentation, and enhancement of First Detector and Educator training materials to extend surveillance activities in the SE US and Caribbean.

P-29 Regional Highlights from the Northeast Plant Diagnostic Network (NEPDN)

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Established in 2002, the NEPDN focuses on diagnostician training and education through facilitating significant pathogen workshops and distributing published materials such as pest alerts and standard operating procedures. Our members present material on plant pathogens and pests to a wide variety of audiences that may, in-turn, pass the information onto others, and those to others, causing a cascading effect of information distribution. The NEPDN is committed to readiness preparation and ensures our readiness by conducting exercises with our member states. We have trained first detectors and keep them engaged by offered advance first detector trainings and by providing on-line resources. We are committed to maintaining an interactive website that contains an abundance of information for use by NPDN members, first detectors and the public. Each and every state within our region has made significant contributions to the network and their own state's plant health. Highlights of significant events will be provided on this poster to illustrate just how important the NEPDN project is to the health and well being of the plant industry in the Northeast region.

P-30 The Governance of NPDN: From Concept to Ratification

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Four months and seven years ago, our national program leader brought forth on this continent, a new notion, conceived in a hurry and dedicated to the proposition that all states will be connected. Now we are engaged in a great diagnostic network, testing whether that notion, or any notion so conceived and so dedicated, can long endure. We are met at a national meeting of that Network. We have come to communicate, collaborate, and to adopt the rules of governance so that that Network might live. It is altogether fitting and proper that we should do

this. The NPDN Executive Committee struggled over this document; it is now within your power to add or detract. The USDA will little note, nor long remember what we say here, and it may forget what we do here. But, it is for us to be dedicated to the great task remaining before us – ratification. From the Executive Committee, please take increased devotion to that cause for which they gave some measure of devotion. Be resolved that this process shall not have been in vain -- that this Network shall be sustained -- and that governance of the Network, by the Network, for the Network, shall not perish from the U.S. We the Members of the National Plant Diagnostic Network, in Order to form a more perfect Network, establish Secure Communications, ensure early detection, provide for accurate diagnostics, promote Plant Health, and secure our natural and agricultural plant systems for ourselves and our Posterity, do ordain and establish this Governance Charter for the National Plant Diagnostic Network. *I offer my sincerest apologies to President Abraham Lincoln and the framers of the U.S. Constitution for flagrant plagiarism and unforgivable distortion of two historic documents.

P-31 GPDN: Strengthening partnerships

Stack, J.*, Dobesh, S., O'Mara, J., Schrum, E., and Ryba-White, M. GPDN, Kansas State University, Manhattan, KS

The Great Plains Region of NPDN includes Colorado, Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming spanning 3000 kilometres south to north and 1200 kilometres from east to west. This is an area of intensive agricultural production systems that are fully integrated with animal-based agricultural systems. There are ca. 554,900 farms in the Great Plains region, occupying over 70 million hectares (273 thousand square miles) of wheat, corn, soybean, sorghum, millet, sunflower, potato, dry beans, and a variety of specialty crops including grass seed, chickpea and onion. As much as 50% of some commodities, including grains for animal feed, for human consumption, and seed for crop production, are exported to nations all over the world. GPDN member states share responsibility in realising NPDN goals and provide leadership for specific Network activities including diagnostic workshops (e.g., PCR-Texas and Kansas, mycotoxins-Montana, vectors and pathogens-Montana, ornamental plants-Colorado, RNA viruses-North Dakota, Montana, and Oklahoma). In 2008 and 2009, all GPDN states participated in a region-wide survey to delineate the geographic distribution of wheat viruses. In addition to several first reports for some viruses, virus isolates were distributed to support research programs and the results were reported in a publication in Plant Health Progress. All GPDN states have completed at least one preparedness exercise.

P-32 NPDN launches its Epidemiology Analysis Program

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For five years, the NPDN has been collecting data on diagnostic results from member laboratories with over 430,000 records in the NPDN National Repository maintained by CERIS at Purdue University. The NPDN has initiated analysis of the NPDN National Repository Data. Several analysis tools have been developed and are available for the data analyst and diagnosticians to use. These have been used for wheat streak mosaic virus, high plains virus, soybean rust, late blight of tomato/potato, dogwood anthracnose and other weeds, pests and pathogens. These tools include maps of diagnostic results with degree day layer, highway and waterway overlays, charts, and summary reports. The NPDN has also launched a first submission report which lists pests, weeds and diseases that have been submitted for the first time for each state into the NPDN repository. The completion of the NPDN Data Access Policy has greatly facilitated this launch. As a pilot program, the Great Plains Diagnostic Network obtained permission from the State Department of Agriculture State Plant Regulatory Officials (SPRO's) to share wheat virus data among member states. This allowed all involved in the GPDN states, including SPRO's and SPHD's, to see the results of a regional analysis of a GPDN wheat virus survey data, while maintaining confidentiality of individual data from each state.

P-33 The National Plant Diagnostic Network STAR-D

Vitoreli A.*, Snover-Clift, K., Hammerschmidt, R., Harmon, C.L., Putnam, M., Shiel, P., Tidwell, T., Gaimari, S., Ruhl, G., and Smith, C. Department of Plant Pathology, University of Florida, Gainesville, FL, Department of Plant Pathology and Plant-Microbe Biology, Cornell University, Ithaca, NY, Michigan State University, East Lansing, MI, Oregon State University, Corvallis, OR, USDA-APHIS-PPQ Center for Plant Health Science and Technology, Raleigh, NC. CDFA Plant Pest Diagnostic Center, Sacramento, CA , Purdue University, West Lafayette, IN, University of New Hampshire, Durham, NH.

The Food and Agriculture Defense Initiative was established in 2002 to enable the United States Department of Agriculture to develop a network linking plant and animal disease diagnostic facilities across the USA. The National Plant Diagnostic Network (NPDN) is the plant disease component of this network. The mission of the NPDN requires quick and accurate diagnosis of high consequence plant pathogens, weeds and insect pests that may threaten national security; communication of such information response authorities; the ability to scale up and manage sample surge as needed; and diagnostic data security. To accomplish these objectives, the NPDN relies on diagnostic data generated by laboratories in Land-Grant Universities, State Departments of Agriculture, and USDA-APHIS. Traditionally, these laboratories have provided diagnostic services at the State or regional levels at a high level of competence. However, to accomplish the national objectives listed above, a standardized approach to diagnosis is required, particularly if the diagnosis has regulatory implications. The NPDN System for True, Accurate, and Reliable Diagnostics (STAR-D) is being developed to enable participating laboratories to meet standards of quality for laboratory management, facilities, equipment, and trained personnel. The ISO 17025 Quality Standard can be adapted to testing done by NPDN diagnostic laboratories by providing a basis for a quality system to meet the needs of the NPDN.

P-34 The National Plant Diagnostic Network Diagnostics Subcommittee

Vitoreli, A.*, Snover-Clift, K., May, S., Balbalian, C., Blunt, T., Byrne, J., Floyd, J., Gaimari, S., Carla Garzon, C., Grantham, R., Hale, F., Levy, L., Hodges, A., O'Mara, J., Putnam, M., Rane, K., Ruhl, G., Shiel, P., Schrum, E., Tidwell, T., and Tiffany, M. Department of Plant Pathology, University of Florida, Gainesville, FL, Department of Plant Pathology and Plant-Microbe Biology, Cornell University, Ithaca, NY, The Pennsylvania State University, University Park, PA, Mississippi State University Mississippi State, MS, Colorado State University, Fort Collins, CO, Michigan State University, East Lansing, MI, USDA, APHIS, PPQ, National Identification Services, Riverdale, MD, CDFA Plant Pest Diagnostic Center, Sacramento, CA , Oklahoma State University, Stillwater, OK, University of Tennessee Extension, Nashville, TN, USDA-APHIS-PPQ Center for Plant Health Science and Technology, Beltsville, MD, Department of Entomology, University of Florida, Gainesville, FL, Kansas State University, Manhattan, KS, Oregon State University, Corvallis, OR, Department of Entomology, University of Maryland, College Park, MD, Purdue University, West Lafayette, IN, USDA-APHIS-PPQ Center for Plant Health Science and Technology, Raleigh, NC.

Established in January of 2003, the initial goals of the subcommittee were to coordinate websites, create a listserve for communications, establish objectives, coordinate permit acquisition, compile lists of regionally significant agents, create standard operating procedures (SOPs), and to coordinate select agent workshops. The committee has grown to include two representatives from each of the NPDN regions plus USDA, APS, and industry representation. Each year the committee has continued to improve and add to the SOPs that first focused on the most pressing select agent pathogens and now include current threats such as the laurel wilt pathogen and the pink hibiscus mealybug. The laboratory accreditation working group, a subgroup of the diagnostics subcommittee, has worked towards creating a quality assurance program that will provide quality standards for types of testing that can be carried out by all NPDN laboratories. Numerous workshops have been developed in collaboration with our USDA and University partners such as the Beltsville workshops focusing on morphological and molecular testing for highly significant pathogens and for the entomologists, the *Lepitoptera* workshops offered on both coasts. The diagnostics subcommittee members are constantly developing new training efforts. Based on survey information submitted to the subcommittee on training needs, the next project will be the development of a basic techniques workshop. As a subcommittee, our members strive to keep NPDN diagnosticians and collaborators informed and prepared for that next, new, significant pathogen or pest.

P-35 The National Plant Diagnostic Network National Database Subcommittee

Vitoreli, A*, Snover-Clift, K., Gregory, N., Barber, D., Coggeshall, A., Draper, M., Hill, M., Rane, K., Russell, V., Schwartzburg, K., Thomas, C., and Tidwell, T., Department of Plant Pathology, University of Florida, Gainesville, FL, Department of Plant Pathology and Plant-Microbe Biology, Cornell University, Ithaca, NY, Department of Plant & Soil Sciences, University of Delaware, Newark, DE, Consortium for Internet Imaging and Database Systems, University of Georgia, Athens, GA, Department of Plant Pathology, University of California, Davis, CA, Cooperative State Research, Education and Extension Service, Washington, DC, Center for Environmental and Regulatory Information System, Purdue University, West Lafayette, IN, Department of Entomology, University of Maryland, College Park, MD, USDA-APHIS-PPQ Center for Plant Health Science and Technology, Raleigh, NC, CDFA Plant Pest Diagnostic Center, Sacramento, CA

Established in January of 2006, the goals of the National Database Subcommittee are to create guidelines and review documents that instruct NPDN users on how to properly use the National Repository system and also to review existing data fields to determine if they meet current needs. The subcommittee has been very productive accomplishing tasks that include updating the NPDN Upload Guidelines, assisting in the planning and coordination of "Phase 2" data collection and roll-out, creating a review team to process user change requests to the EPA pest and host code listings, and editing the existing EPA pest and host codes and recommending changes. Statistics of the pest code additions, deletions and modifications made by this subcommittee show how much information has been reviewed by the subcommittee members. The subcommittee will continue to provide support for new EPA pest and host code requests, review and update the EPA pest codes and improve the NPDN Upload Guidelines.

CATEGORY: NEW PEST DETECTIONS/STATE UPDATES

P-36 Connecticut first reports 2009: Setomelanomma holmii on Picea abies and Gymnosporangium yamadae on Malus sp.

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Two first reports for the state of Connecticut were documented in 2009 at the University of Connecticut Home & Garden Education Center's Plant Diagnostic Laboratory. The first, *Setomelanomma holmii* M. Morelet, was observed on *Picea abies* cultivar 'Clanbrassiliana stricta' or Tolleymore spruce. *S. holmii* has been associated with a condition known as "sudden needle drop" (SNEED) on Colorado blue spruce, white spruce and Norway spruce in several midwestern states. The Connecticut Tolleymore spruces exhibited the symptoms described for this condition and the fungus was sporulating prolifically on the affected twigs. *S. holmii* is an ascomycete in the Pleosporales, Phaeosphaeriaceae. It was identified by microscopic examination of the ascomata and ascospores. While the fungus has consistently been associated with the symptoms of sudden needle drop, a pathogenic relationship has not yet been proven. Japanese apple rust, *Gymnosporangium yamadae,* was confirmed on *Malus* sp. in Fairfield County. The pathogen was identified using microscopic analysis of the aecia, aeciospores and peridial cells from apple leaves.

P-37 The Pacific Plant Biosecurity Network: Building on NPDN's success

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Although Hawaii is a major pathway for movement of plant material between Asia and the US mainland, less than 2% of domestic and foreign imported plant products are inspected. This lack of inspection also threatens the continued export of Hawaii's foliage and ornamental crops. Hawaii's Invasive Species Committee estimates that one new pest species arrives each day. Although most pests do not become established, a quick coordinated response involving state and federal agencies and Hawaii's WPDN program is required for detection, identification or diagnosis. Coordinated efforts are also needed to prevent, prepare for, delimit and manage accidentally or deliberately introduced pests. Building on the NPDN model, we have proposed creation of a Pacific Plant Biosecurity Network composed of state and federal agencies and programs responsible for agrosecurity. Members will include: Hawaii Dept. of Agriculture, Department of Homeland Security Customs and Border Protection, Animal and Plant Health Inspection Service, Agriculture Research Service, Food and Drug

Administration, Hawaii Civil Defense, the Coordinating Group for Alien Pest Species and the Honolulu Police Department. The PPBN will (1) facilitate communication between its members and Hawaii's WPDN program, and (2) help identify and prioritize research, education, and extension efforts to protect agriculture in Hawaii, the U.S. mainland, and the U.S. affiliated islands in the Pacific.

P-38 Mississippi State University diagnostics and new pest detections 2008-2009

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The Mississippi State University Plant Disease and Nematode Diagnostic Lab is a member of the National Plant Diagnostic Network's (NPDN) southern region, which is composed of labs in 12 states, Puerto Rico and the Virgin Islands. During the period from 2008 through 2009, the MSU lab received general plant disease and nematode diagnostic samples from 13 states representing 3 NPDN regions. From these general samples, laurel wilt was confirmed in MS in August, 2009, and *Bipolaris oryzae* was observed and confirmed causing leaf spot on switchgrass seedlings (*Panicum virgatum* 'Alamo'). Both diseases are first reports for Mississippi and have inspired further survey and research projects led by MSU entomology and plant pathology research faculty with funding from non-NPDN sources. Mississippi's state plant regulatory officer solicited assistance with a stored sweet potato end rot of unknown etiology that is causing multi-million dollar losses to producers in Mississippi. NPDN funding is one of several sources of funding helping to support research into the sweet potato end rot problem, as well as a soybean cyst nematode (SCN) survey being conducted in Mississippi in response to expanding soybean acreage and an increase in reports of SCN related yield losses.

P-39 AZPDN: an Inter-Institutional/Inter-Agency Plant Diagnostics Network

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The Arizona Plant Diagnostic Network (AZPDN) comprises Extension and Research Faculty and IT specialists at The University of Arizona (UA), diagnosticians in the Arizona Department of Agriculture (ADA), and the APHIS Plant Protection and Quarantine (PPQ) branch in Phoenix. UA laboratories are located throughout the state (Maricopa, Tucson, Safford, Willcox, and Yuma) on the main campus in Tucson (Entomology, Plant Sciences, and UA Herbarium) or at UA research centers in Maricopa (MAC) and Yuma (YAC) and/or County Extension Offices in Safford and Willcox. These labs provide diagnoses that span the specialties of bacteriology, mycology, nematology, virology, virus-vector biology, and abiotic diseases. Other laboratories specialize in the identification of arthropods (crops, forests, urban) or indigenous and invasive weed species, and urban horticulture. Pest and pathogen identifications are reported monthly by UA triage laboratories to the National Plant Diagnostics Database. ADA is responsible for statewide regulatory authority regarding invasive and actionable pests and pathogens, and coordination and execution of CAPS surveys for target pests and pathogens. PPQ is charged with safeguarding the Nations $1.5 trillion agricultural economy, through careful inspection, detection and protection activities. The AZPDN meets twice annually to share information, discuss new pests and pathogens, and stay abreast of cross-institutional/agency developments relevant to the AZPDN.

P-40 Detection of a new *Globodera* species during surveys of Oregon seed potato fields for potato cyst nematodes

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The potato cyst nematodes, *Globodera pallida* and *G. rostochiensis,* are recognized worldwide as serious pests on *Solanum tuberosum*. In the United States, both are considered quarantine pests. Recent detections of *G. pallida* in Idaho and *G. rostochiensis* in Alberta and Quebec, Canada, led to a national survey for these pests in states producing seed potatoes. Since 2006, the USDA APHIS PPQ has required all states that produce seed potatoes to survey fields for potato cyst nematodes. Soil samples were collected from seed potato fields using the most current national survey protocol at the time of collection. The soil samples were dried and then processed using a USDA Soil Cyst Washer; the resulting flotsam was examined microscopically for cysts. A total of 3,830 soil samples were collected from seed potato fields planted in 2006 and in 2007. No potato cyst nematodes were detected. However, suspicious cysts were found in soil samples collected from a field in Crook County that had been planted in 2007 with true potato seeds. Initial examination showed the cysts most closely resembled a

Globodera. Per USDA APHIS PPQ protocol, the suspicious cysts were forwarded to the National Identifier for official confirmation. Morphologically, the cysts most closely resembled *G. pallida*. However, molecular analyses showed the cysts were genetically distinct from all three known *Globodera* species, indicating a new species had been detected.

P-41 New Mexico State University Plant Diagnostic Clinic

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The New Mexico State University Plant Diagnostic Clinic provides plant diagnostic services, First Detector Training and Plant Pathology related workshops for the state of New Mexico. The clinic serves as a support lab for the New Mexico Department of Agriculture and the National Plant Diagnostic Network (NPDN). Since 2004, New Mexico State University has participated in the NPDN's western region. With assistance from NPDN and other diagnostic grants, our clinic has grown from a poorly funded, single discipline diagnostic clinic that processed approximately 400 disease samples annually; to a well funded, integrated clinic that now processes approximately 9,000 disease, insect and plant identification samples. The diagnostic capability of the clinic has improved through increases in clinic staff and equipment. Although still limited, our molecular diagnostics continue to grow. As a result of increased capability, we have identified several new pathogens in New Mexico. Among the most interesting include: *Xylella fastidiosa* in chitalpa, grapes and catalpa, Septoria leaf spot and Alternaria leaf spot of pistachio, apple mosaic virus in hops, and tomato spotted wilt virus in cowpea. Our educational programming efforts have also increased significantly with the continued support from the NPDN. This support has enabled us to reach a much broader range of clientele. To date, a total of 4,236 people have been introduced to the NPDN through with 418 Certified First Detectors

P-42 White bryony (*Bryonia alba*) reported in Gallatin County, Montana

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White bryony is a member of the Cucurbitaceae family native to temperate Eurasia. This species is a vine capable of up to six inches of growth per day. The root system is tuberous, between six and eighteen inches in length. It was first reported in the Pacific Northwest in the 1950's, with the majority of the reports occurring in the 1970's. It is currently found in Washington, Idaho, Utah, and Montana. Of these states, Washington and Idaho list this species as a noxious weed. The known range of white bryony in Montana is limited to six counties: Big Horn, Gallatin, Missoula, Park, Sweetgrass, and Stillwater. This species had not been reported in Gallatin County until July, 2009, when it was found in Bozeman. Populations in Sweetgrass County have also been confirmed along the Yellowstone River. Studies are currently underway to determine the extent of its range in Gallatin County. Additional research is planned to verify populations in Big Horn, Missoula, Park, and Stillwater counties. The MSU Schutter Diagnostic Lab and Urban IPM program is being used to promote public awareness of white bryony through news releases, flyer distribution, and public information forums. These methods are also being used to encourage recognition and early management of this species.

P-43 New and emerging plant diseases in Arkansas

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Several new or previously minor plant diseases have recently emerged in Arkansas to damaging levels. These include Neocosmospora stem rot of soybean (*Neocosmospora vasinfecta*), black root rot of soybean (*Thielaviopsis basicola*), dogwood anthracnose (*Discula destructiva*), and false smut of rice (*Ustilaginoidea virens*). Neocosmospora stem rot was detected in at least eight counties during 2008, and readily confused with red crown rot caused by *Cylindrocladium crotalariae*. Black root rot has not previously been reported in the state as a problem on soybean but was found to be causing heavy damage in specific crop rotations and soil types the past three years. Dogwood anthracnose was first reported in Arkansas by the Plant Health Clinic in 2008 and in subsequent surveys has been found in most counties of the state, suggesting long term establishment. False smut of rice was first reported in Arkansas in 1997, but emerged in 2008 and 2009 as a more important problem, affecting many fields in the state. For unknown reasons, false smut has emerged as a problem in many rice

regions of the world during the past few years. Efforts to monitor and assess the destructive potential of these and other diseases in Arkansas continue.

P-44 Japanese apple rust confirmed in Eastern United States in 2009

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Following a report in April 2009 of the presence of *Gymnosporangium yamadae* in Delaware, University of Delaware, State and USDA officials met to confirm the find. Japanese apple rust had been reported on crabapple by a USDA/ARS researcher in 2004 and 2008 from Wilmington, DE. *G. yamadae* is the causal pathogen, known from Asia with an aecial state on domestic *Malus* spp. and the telial state on *Juniperus chinensis*. Personnel from UD, DE Dept of Agriculture and USDA/APHIS/PPQ visited the Wilmington site and surrounding juniper species were noted. Telia were found on May 7, 2009 on ornamental *J. chinensis* near the original crabapples, and confirmed to be *G. yamadae*, the first report of the telial stage in North America. In July, crabapple leaves with upper leaf spots and lower leaf aecia were collected, and identified as the aecial stage of *G. yamadae*. Leaves of *M. domestica* on the UD farm were confirmed to have Japanese apple rust on Aug 4, 2009, the first report on domestic apple in the U.S. A pest alert was developed to distribute to NPDN diagnosticians and the National Plant Board, with descriptions of *G. yamadae*. Specimens submitted to the National Mycologist indicated widespread incidence in the Northeast, including MD, ME, NH, NJ, NY, PA, and RI. Japanese apple rust may have previously gone unnoticed due to similarity to cedar apple rust (*Gymnosporangium juniperi-virginianae*), but efforts are underway to determine establishment and impact.

P-45 Exotic pest detection efforts in Tennessee

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The high cost of exotic pest introductions is directly impacting each state. In Tennessee, state and federal agencies have a close working relationship that has allowed us to maximize our efforts. Federal funding through the CAPS program has been essential for many of the exotic pest surveys conducted each year. In 2009, CAPS surveys include a visual firewood survey for wood-boring insects and the oak disease complex; wood-boring bark beetle trapping survey; nursery and greenhouse survey; soybean complex field survey; and a bee mite survey. One wood-boring insect pest that has been detected in the adjacent states of Missouri and Kentucky is the emerald ash borer. Purple sticky traps for emerald ash borer have been monitored in Tennessee since 2007 with no detections. NPDN/SPDN funding and education have been instrumental in raising plant pest diagnostic capabilities at both the University of Tennessee Soil Plant and Pest Center and state-wide. There have been three cogangrass educational meetings conducted in Tennessee. In 2008, cogangrass was detected at one location in Lexington, TN (Henderson County). The Tennessee Department of Agriculture (TDA) is attempting eradication and the infestation is not thought to have spread. Small broom rape, *Orobanche minor*, was detected in Shady Valley, TN (Johnson County) in 2009 and eradication is being attempted. Sentinel soybean plots are monitored for soybean rust each year. This program lets Tennessee growers know whether protective fungicide sprays are needed or not. Soybean rust was detected in the Memphis, TN area (Shelby County) on September 4, 2009. In 2008, light brown apple moth pheromone traps were put out across the state by the TDA with none being found. Brown marmorated stink bug was found in the Knoxville area (Knox County) in March 2009. Twobanded Japanese beetle was found in Jackson, TN (Madison County) on July 9, 2009. Hosta virus x was first detected in Tennessee on hosta in 2007 and canna yellow mottle virus was found on canna in 2008. Imported fire ants have expanded their range and there are now 43 total counties and 13 partial counties under quarantine restrictions. TDA plant inspectors routinely monitor for sudden oak death, thousand canker disease, chrysanthemum white rust, hosta virus x, cogongrass, and many other pests.

P-46 Freesia sneak virus (FreSV) on freesia: a first detection for Virginia and the United States

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Samples of freesia cvs. 'Honeymoon' and 'Santana' with unusual symptoms of leaf flecking were received from a commercial cut flower grower by the Virginia Tech Plant Disease Clinic in spring 2008. Symptoms of coalescing, chlorotic, bleached, brown and purple leaf spots were scattered in the planting. After microscopic examination failed to reveal any pathogens or arthropods, images of the unusual symptoms were submitted to Agdia, Inc.'s diagnostics listserv. One responder suggested a newly reported virus, Freesia sneak virus, might be the cause. Plant samples were forwarded to the USDA-ARS Floral and Nursery Plants Research Unit in Beltsville, MD, for viral analysis. Both potyvirus and ophiovirus particles were detected by transmission electron microscopy. Fourteen of 15 symptomatic plants tested positive for ophiovirus and 2 of the 15 plants tested positive for potyvirus by reverse transcriptase (RT)-PCR. The ophiovirus coat protein (CP) gene, amplified by RT-PCR with primers from FreSV, was confirmed by sequence analysis to be from FreSV, whereas amplified partial potyvirus coat protein was identified as Freesia mosaic virus (FreMV) CP. Although soil-borne freesia leaf necrosis disease has been reported in Europe since 1973, several viral causal agents have been implicated. In the Virginia freesia samples, presence of FreSV, but not FreMV, was strongly correlated with leaf necrosis symptoms. Use of the diagnostics listserv was instrumental in diagnosing this disease.

P-47 New invertebrate, plant disease and weed detections in Louisiana from 2007 to 2009

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A multitude of invertebrates, plant diseases and weeds have been detected and/or became established in Louisiana from 2007 to 2009. The list of invertebrates include the panicle rice mite, *Steneotarsonemus spinki*; the wooly whitefly, *Aleurothrixus floccosus*; the asian citrus psyllid, *Diaphorini citri*; the west Indian sugarcane stalk borer, *Diaprepes abbreviatus*; the Mexican rice borer, *Eoreuma loftini*; the cactus moth, *Cactoblastis cactorum*; and the giant pecan scale, *Neostengalia texana*. The channeled apple snail, *Pomacea canaliculata*, has also been spreading throughout the state. The plant diseases detected in the state include huanglongbing (citrus greening) caused by *Candidatus* Liberibacter asiaticus; bacterial leaf scorch in blueberries and oleander associated with *Xylella fastidiosa*; mirliton powdery mildew caused by *Podosphaera xanthii*; leaf and sheath blight of *Pennisetum glaucum*, Jade Princess ornamental millet caused by *Rhizoctonia* spp; and basil downy mildew caused by *Peronospora* sp.. The plant species *Lilaeopsis chinesis*, eastern grasswort was detected in a nursery in southeast Louisiana.

P-48 First report of *Diaporthe stewartii* as a pathogen of buckwheat

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Cultivated buckwheat (*Fagopyrum esculentum* Moench) is one of several minor broad-leaf crops grown in North Dakota (ND). In September 2008, a diseased sample was collected from a buckwheat variety trial at NDSU North Central Research Extension Center, Minot, ND (-101.555556^{o} W 48.404167^{o}N). Plants were senescing prematurely and lacked leaves. Main stems appeared uniformly senesced, with canker-like lesions and underlying light brown discolored pith or minimal to no pith. A *Phomopsis/Diaporthe*-like fungus was recovered from symptomatic tissue, and it was subsequently identified as *Diaporthe stewartii* A.L. Harrison based on the sequence of the internal transcribed spacer rDNA region. In a pathogenicity experiment using a randomized complete block design with five inoculated varieties and a non-inoculated control, *D. stewartii* consistently caused symptoms on all varieties of buckwheat tested. Mean lesion expansion ranged from 1.93 cm to 3.68 cm for the inoculated varieties, and these differed significantly from the mean lesion length of the non-inoculated control (0.00 cm). The fungus was consistently re-isolated from infected plants and its identification was confirmed via

morphology and DNA sequencing, fulfilling Koch's postulates. To our knowledge, this is the first report of *D. stewartii* as a pathogen on buckwheat in North Dakota.

P-49 Highlights of prominent Pennsylvania plant diseases and diagnostic training

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Many important and potentially devastating diseases occur on Pennsylvania's crops and ornamental plants. A decade ago, plum pox virus was first detected in the United States in Adams County, Pennsylvania. Since then, strict quarantine and eradication efforts have helped to reduce this threat to our stone fruit crops. The 2009 growing season brought cool weather and abundant rain throughout Pennsylvania and the northeastern United States. The weather created the perfect conditions for the rapid spread of many plant pathogens, including late blight on potato and tomato and downy mildew on cucurbit crops. Rapid detection and outreach efforts effectively communicated essential information about these important vegetable diseases. Since the 1930s Dutch elm disease has been devastating the nation's American elm population. Penn State University's main campus is home to one of the most mature remaining elm stands in the country, with elms dating back to the 1890s. A dedicated Dutch elm disease control program has guarded these majestic trees from a pathogen that altered our nation's landscape in a few short decades. Now these elms face a new lethal threat, elm yellows. In May 2010, Penn State, in collaboration with the NPDN, will be hosting a plant disease diagnostics workshop. This workshop will provide hands on training for diagnosticians covering a broad range of plant diagnostic topics.

P-50 Guam's native cycads attacked by a coalition of invasive species

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In a 2002 forest survey, *Cycas micronesica*, was listed as the most numerous tree-sized plant in Guam's forests. In 2006 this species was placed on the IUCN Red List of Threatened Species in response to high mortality from simultaneous attack by recently introduced invasive species including the cycad aulacaspis scale, *Aulacaspis yasumatsui*, the cycad blue butterfly, *Chilades pandava*, and a lepidopteran leafminer, *Erechthias* sp. The coccinellid, *Rhyzobius lophanthae* has been established as an effective biocontrol agent for the cycad aulacaspis scale. However, the cycad population continues to decline from damage caused by other herbivores. This poster diagrams ecological relationships between *Cycas micronesica* the invasive species which threaten its existence.

P-51 New Records for Plant Bug Species in Montana

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In the late summer of 2009, a species of plant bug (Heteroptera: Miridae) with prominent red and black markings was collected in three counties in north central Montana. The insects were associated with damage on a variety of landscaping and shelterbelt plantings. Specimens were submitted to the Schutter Diagnostics Laboratory at Montana State University and identified as the caragana plant bug, *Lopidea dakota* Knight. Though this insect has likely occurred in Montana at low numbers previously, there were no previous confirmed records in the Plant Diagnostic Information System database for Montana and no specimens were present in the Montana Entomology Collection (Montana State University). During 2009, *Deraeocoris aphidiphagus* Knight and *D. brevis* (Uhler) (Heteroptera: Miridae), both beneficial predatory plant bug species, were also found in the state. These are the first confirmed records of all three of these plant bug species for Montana.

P-52 Palm diseases caused by phytoplasmas in Texas

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The state of Texas has two quarantines on its administrative code for palm diseases caused by phytoplasma: Lethal Yellowing and Date Palm Lethal Decline (syn. Texas Phoenix Palm Decline). These two diseases are caused by two distinct strains of the group 16SrIV phytoplasma: subgroup 16SrIV-A and 16SrIV-D, respectively. In the 1970s, part of south Texas experienced an outbreak of disease causing palm to decline which was considered to by synonymous with Lethal Yellowing. In recent analyses of samples from south Texas, RFLP analysis of nested-PCR product revealed phytoplasma from subgrounp 16SrIV-D. Distribution of this problem appears to be confined to the south Texas region based on an informal survey based on samples collected or

submitted to the Texas Plant Disease Diagnostic Lab. There is a growing concern for the movement of these diseases as demands for palms trees in landscape increases. Our current body of knowledge is lacking and a need for a comprehensive survey may be necessary to better evaluate the extent of one or both these diseases in Texas.

P-53 Achievements of the Florida Plant Diagnostic Network 2007-2009

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Given the enormous range of land over which Florida farms, forests, rangelands and agriculture related facilities are dispersed, it is critical that we have a similarly widespread capacity to detect, diagnose, and respond to intentional and accidental introductions of plant diseases, insects and other plant pests. To meet this demand the Florida Plant Diagnostic Network (FPDN), UF/IFAS provides rapid evaluation and reporting of potential pest threats, quick response time for diagnosis through DDIS, Web-based secure communication links among regional and national diagnostic labs, established links to regulatory agencies including APHIS and FDACS, high quality and uniformity of information associated with samples, high quality record keeping and reporting of pest outbreaks, and a trained network of First Detectors. Since January 2007 efforts from the FPDN have resulted in 42 new plant host records for arthropods, 15 first disease reports, 3 statewide polycom pest update training sessions, 4 First Detector Educator events, 3 examples of county agents taking leadership in conducting training, and 2 First Detector workshops. Many of these training sessions have resulted in increased use of DDIS demonstrating a heightened awareness of insect pests and plant diseases throughout the state.

P-54 First detection of Goss's bacterial wilt and leaf blight on corn in Indiana

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The Purdue Plant and Pest Diagnostic Laboratory (P&PDL) confirmed the first occurrence of Goss's bacterial wilt in Indiana. The disease, caused by *Clavibacter michiganensis* subsp. *nebraskensis* was detected on field corn and popcorn submitted from northwest Indiana in August of 2008. Confirmation of the causal agent was obtained through isolation of the bacteria from infected leaf tissue onto selective media, DNA Sequence analysis, and by completing Koch's postulates. This confirmation was of regulatory importance with regard to potential export restrictions of seed corn and popcorn to select countries. Corn fields consisting of approximately 6,879 hectares across two counties exhibited characteristic tan to gray lesions with dark freckling and shiny bacterial exudate. It is suspected that early hailstorms and heavy rains and windstorms contributed to establishment and dispersal of Goss's Wilt in fields in Indiana in 2008. Disease severity was much less in 2009. First detector training on Goss's Wilt was offered to concerned growers, within a week of the find, by the NPDN diagnosticians in the P&PDL and the Agronomic Plant Pathology Extension Specialist. The training session was centrally located within the infected counties. Pertinent information on the disease was provided as well as on-site preliminary testing of suspect infected corn with serological Immunostrips® and microscopic examination for bacterial ooze.

P-55 "The perfect storm": Late blight devastates tomatoes in Indiana

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Rainy, cool, cloudy conditions this past summer combined with the suspected introduction of tomato transplants infected with *Phytophthora infestans* exposed Indiana tomato growers to serious crop loss from the fungal-like disease known as late blight. This destructive plant disease was last reported in Indiana in 1998 on potatoes. *Phytophthora infestans* was microscopically confirmed in the Purdue Plant and Pest Diagnostic Lab on a tomato sample submitted on August 7th, 2009. As of September 11, 2009, we have confirmed late blight in twenty-five counties in Indiana, including vegetable gardens as well as commercial fields of processing and fresh market tomatoes. We used this outbreak as a teaching tool to educate our clientele on the importance of a vigilant eye, protective spray programs, sanitation, disease epidemiology, and look alike disease symptoms. To encourage submission of samples for confirmation of late blight we offered to diagnose all suspect infected tomato samples free of charge during August –September. We maintained a "What's Hot with Late Blight" page on our PPDL website, including images of the disease, sanitation protocol, an up-to-date map of infected counties and pertinent

links to other informational sites. Disease spread was explosive due to favorable conditions and tomatoes not protected with one of the registered fungicides were consumed by the late blight pathogen.

P-56 New host records of plant pathogens from Idaho

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New host –pathogen reports provide vital information helpful in the quick and accurate diagnosis of plant diseases for extension educators, plant disease diagnosticians, regulatory officials and other plant health professionals while contributing to taxonomic studies. Equally important are publication these reports in a timely manner and the ability to rapidly search for the information contained in these reports. First reports contribute to accurate diagnostics and help improve our knowledge of biogeography and host range in the region and pathogen biology. New pathogen reports and their accurate identification establish the baseline information about any emerging new plant pathogens and the epidemiology of the diseases caused by them. Presented herein are examples of first reports of plant pathogens on regional crops: ornamentals, turf grasses and weeds from Idaho. [2006-2009]. *Leveillula taurica,* the polyphagous powdery mildew pathogen is newly reported on the following native flowering plants [Forbs]: *Cleome hassleriana, C. lutea, C. serrulata, Sphaeralcea coccinea, S. grossulariifolia, S. parvifolia, Astragalus filipes and Penstemon speciosus.* Common weeds in and around onion fields in Idaho [*Lactuca serricola, Tribulus terrestris, Chenopodium album, Amaranthus retroflexus and Kochia scoparia*] are identified as new alternate weed hosts of *Iris Yellow Spot Virus* [IYSV] infecting onion. New rusts records: *Puccinia similis* on *Artemisia tridentata* and *Puccinia graminis* on *Poa pretensis* and natural Infection of *Penstemon acuminatus* with *Cucumber mosaic virus.*

P-57 The state of ironwood (*Casuarina equisetifolia* subsp. *equisetifolia*) decline on the Pacific island of Guam

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Despite the myriad of utilities and merits of the ironwood tree (*C. equisetifolia* subsp. *equisetifolia*) to the Pacific island of Guam, its future is in doubt as its health and survival rate has been deteriorating since 2003. With the award in 2008 of a three-year Western Region Sustainable Agriculture Research and Education grant, research began in earnest September 2008. An international team of researchers participated in an "Ironwood Tree Decline Conference" on Guam in January 2009. As a result of the working conference, it was concluded that a complex of biotic and abiotic factors are most likely responsible for the decline. Possible biotic factors include fungi of the genera *Ganoderma*, *Pestalotia*, *Botryosphaeria*, and *Fusarium* and several yet unidentified fungi and bacteria. Insects that may play a role in decline are termites and a newly discovered eulophid wasp which forms galls in branchlet tips. Among the abiotic factors are the major typhoons Chata'an (July, 2002) and Pongsona (December, 2002), the intervening severe drought, and proximity to urban development. Decline prevalence was highest on plantations (wind breaks, beaches, parks, and golf courses). The healthiest ironwood trees are located on Cocos Island, a *Casuarina* dominated island just 1.6 miles off the southern tip of Guam, and at Ritidian Point, a National Wildlife Refuge located on the northern tip of Guam.

P-58 Plant diagnostics in American Samoa

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As the only United States territory in the South Pacific, American Samoa sits at a crossroads in the movement of goods and travelers between the U.S. and the countries of the South Pacific. The territory is thus subject to new pest introductions from both the U.S. and from its own regional neighbors. It in turn can serve as a stepping stone for movement of exotic pests in both directions. The vulnerability of the territory's agricultural and natural ecosystems is illustrated by the complete elimination of susceptible traditional taro varieties by the introduced taro leaf blight in the 1990s and the damage to native coral trees from the exotic erythrina gall wasp in recent years. The American Samoa Community College's plant clinic was established in 2000 to provide pest diagnoses and management recommendations to the community. It also provides the first level of screening for preliminary identifications of exotic pests. The plant clinic's participation in WPDN has helped bolster its effectiveness through links to regional and national diagnostic expertise and support for training activities.

P-59 Late blight. How conducive weather and broad distribution of inoculums caused devastating damage in New York State in 2009

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During the summer of 2009, the occurrence of late blight of tomato and potato was widespread and devastating. Word of the disease spread quickly through local newspapers, extension newsletters, and on-line outreach programs. It was so significant that it warranted a headline, "You Say Tomato, I Say Agricultural Disaster", in the New York Times. The 2009 occurrence was significant because it differed in three ways from most seasons. First, it was the earliest the disease had been reported over such a broad region of the country, second, infected plants were found in large retail stores throughout the region (Ohio to Maine) and third, due to recent, tough economic times, many more people planted backyard vegetable gardens which made the distribution of tomato plants geographically more dense. Additionally the weather made a significant contribution. The weather during the spring and early summer months was uncharacteristically cool and wet and remained so well into July. Based on testing conducted in Dr. William Fry's laboratory, the clonal lineage of the pathogen isolated from tomatoes has not been found in New York State previously. A couple things are known about this unidentified clonal lineage; it is an A2 mating type and it is a primary pathogen on both tomato and potato. Late blight occurrence in 2009 was devastating due to the abundant presence of the pathogen that was spread out geographically and the conducive environmental conditions. By August 27, 2009, late blight was reported in 55 of 62 counties in New York State.

P-60 An isolated incident of oak wilt found in upstate New York neighborhood

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Plant pathologists at Cornell University confirmed the first incidence of oak wilt, caused by *Ceratocystis fagacearum*, in New York State in August 2008. This lethal disease of red oaks which commonly causes severe damage in the upper Midwest and Texas, less so in the mid-Atlantic states, was found affecting northern red oak (*Quercus rubra*) in Schenectady County. The initial observations of rapidly wilting trees were made by several homeowners and Cornell Cooperative Extension educators. Their inquiries to the Cornell University Plant Disease Diagnostic Clinic led to the collection of branch samples and the analyses that enabled determination of the presence of the pathogen. To date, it appears that the *C. fagacearum* was confined to an area equal to about three city blocks in the town of Scotia, which is about 200 miles (320 kilometers) from the closest, previously known oak wilt infection center. In hopes that this infestation represented a unique, point-source introduction of oak wilt to New York, staff with the NYS Department of Environmental Conservation, with advice from USDA Forest Service pathologists, carried out an eradication treatment that involved the felling and chipping of infected trees as well as neighboring (radius ≤150 m) red oaks. To our knowledge, no newly infected trees have been found either in this area or elsewhere in the state.

P-61 New reports of viruses of ornamental plants in Tennessee

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In Tennessee, hosta virus x on hosta and canna yellow mottle virus on canna were first detected in 2007 and 2008, respectively. Subsequently, virus surveys of hosta and canna at retail and wholesale outlets were conducted in Tennessee. Plants with symptoms of virus infection such as ringspots, mosaic, abnormal green streaks on gold hosta, and oak-leaf pattern were collected for testing. Hosta plants were tested for hosta virus x (HVX) using Immunostrips for HVX from Agdia Inc. Leaves from symptomatic plants were sent to Agdia Inc. where they were assayed for HVX, arabnis mosaic virus, tomato spotted wilt virus (TSWV), tobacco rattle virus (TRV), impatiens necrotic spot virus, and tomato ringspot virus. Virus infected hosta was recovered from 15 of 20 locations. Diseased hostas were collected at all big box stores, from all but one independent garden center and from one of two wholesale nurseries. Twenty-nine hosta cultivars were determined to be infected with one or more of HVX, TSWV, or TRV. Symptoms such as abnormal green streaks were most easily spotted on gold hosta cultivars. Another common symptom was stunting. There appears to be a general lack of knowledge by

nursery and store personnel of the viruses that infect hosta and symptoms associated with virus laden hosta. To increase the awareness of the Green Industry, a web page was created on the Bugwood Network at http://www.ipmimages.org/browse/autimages.cfm?aut=11521.

CATEGORY: PEST ERADICATION/MANAGEMENT

P-62 Strategies to slow expansion of Mountain pine beetle (*Dendroctonus ponderosae*) under outbreak conditions

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Mountain pine beetle is one of the most serious pests of pines throughout western North America. Much of this region is experiencing outbreaks of this pest during the past decade with some forests have almost 100% mortality. The Black Hills of South Dakota has almost 500,000 ha of pine forests and has been in a mountain pine beetle epidemic since the late 1990s. The infestation has expended greatly in the Black Elk Wilderness Area and is spreading to threaten Custer State Park to the south and Mount Rushmore to the north. A strategy to slow the expansion of this insect into the park involved annual aerial and ground surveys to mark infested trees, removal or treating these infested trees and the use of aggregation and anti-aggregation synthetic phermones to direct beetle movement. These tactics have helped reduce the expansion of the population.

P-63 The release of a new beneficial insect for the biological control of soybean aphid, a crop pest in South Dakota

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The soybean aphid, *Aphys glycine* is an important insect pest of soybean, a major crop in South Dakota. First discovered in the U.S. in 2000, it was accidentally introduced to the U.S. from Asia and spread quickly throughout Midwest. Pesticides are currently the primary control method for this pest, but biological control is a promising management approach. Since 2007 South Dakota has been part of a multi-state project to introduce a new specialist natural enemy from Asia to the U.S. for biological control of the soybean aphid. Universities and USDA entomologists identified the parasitoid *Binodoxys communis* as a promising species to release. In the summer of 2008, seven states participated in releases. Releases in South Dakota were a cooperative effort between SDSU scientists, Extension Educators, and South Dakota producers. We released *B. communis* in ten soybean fields in ten counties in eastern South Dakota. We inoculated release sites with a small numbers of parasitoids which might increase and spread over time. Two weeks after release we recovered parasitoids in eight of ten fields. In summer 2009 we will conduct follow-up monitoring near 2008 release sites.

CATEGORY: PEST SURVEYS

P-64 Survey and virulence profile of the *Heterodera glycines* population in Mississippi

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Mississippi soybean acreage has increased by more than 16% successively over the past two seasons and appears poised to continue an upward trend. Reports from county agricultural agents regarding yield losses due to soybean cyst nematode (SCN) are increasing and there is evidence that races may have shifted, rendering ineffective the current crop rotation schemes recommended by the Mississippi State University diagnostic clinic. Because SCN virulence classification is transitioning between the traditional race system and the recently defined HG Type system, we are evaluating Mississippi's SCN population using both systems of classification. In addition to updating the SCN data for Mississippi, this project will provide an excellent opportunity to educate producers who may be unfamiliar with SCN. A race distribution map will be developed for producers, based on the geographic distribution and race classification data collected from the survey. This project also will facilitate updating the Mississippi State University Extension Service SCN publication which will be made available through county extension offices as well as on-line through the MSU-ES website MSUcares.com.

P-65 Great Plains Diagnostic Network Regional wheat virus survey: Collaboration, communication, research and extension outcomes

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Over the past several years, wheat production in the Great Plains has been challenged by recurrent epidemics of wheat virus diseases and the emergence of new viruses. In response to concerns about accurate diagnosis of viruses and the impact to sustainable yields in the wheat crop, members of the Great Plains Diagnostic network collaborated in a region-wide virus survey of wheat in 2008 and 2009. Results showed that *Wheat streak mosaic virus* was the most prevalent virus in our cropping system, *Triticum mosaic virus* and *High Plains virus* were widespread, and *Barley yellow dwarf virus* – PAV and *Cereal yellow dwarf virus* – RPV frequency was minor in both years. The information gathered as a result of this collaborative effort was valuable to diagnostic labs, extension programs, and research efforts. Outcomes include successful grant proposals, manuscripts, extension publications, and educational efforts including calendars and fact sheets. In addition, the widespread nature of the newly identified *Triticum mosaic virus* was documented and it was not listed as a restricted pathogen. Increased communication about viruses has led to several collaborative projects in the region. This effort can serve as a model for group projects in the National Plant Diagnostic Network.

P-66 Pierce's disease of grape detected in commercial vineyards in Oklahoma

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In 2008, *Xylella fastidiosa* subsp. *fastidiosa*, the bacterium that causes Pierce's disease was first detected in Oklahoma grapes in a home garden in Canadian County. Prior to this event, Cooperative Agriculture Pest Surveys (CAPS) in Oklahoma indicated that the bacterium was not present in vineyards. In Aug and Sep 2009, leaf samples were collected from 20 commercial vineyards in 10 counties. Genomic DNA was extracted from petioles and tested for *X. fastidiosa* using the real-time polymerase chain reaction method with genus-specific primers XfF1/XfR2 and dual-labeled TaqMan probe XfP2. Samples from Creek and Tulsa Counties tested positive for *X. fastidiosa.* The samples were tested using conventional PCR with *X. fastidiosa* specific primer sets, RST31/RST33 and BBXFOUTF1/BBXFOUTR1. Amplification products were purified and subjected to automated DNA sequencing. BLASTN alignment of the sequences revealed 99-100% homology with strain *X. fastidiosa* subsp. *fastidiosa,* 'Temecula' (GenBank No. AF534960), which causes Pierce's disease. Remaining petiole tissues were tested for *X. fastidiosa* using the enzyme linked immunosorbent assay. These tests confirmed the presence of *X. fastidiosa* in symptomatic grape tissue. This suggests that the geographic range for Pierce's disease should be extended to include central Oklahoma.

P-67 Survey of viruses on perennials imported from the Netherlands

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In response to growing concern over virus-infected herbaceous perennial imports from The Netherlands, in 2009 the Michigan Department of Agriculture (MDA) continued its program to systematically document the prevalence of viruses in imported perennials. In 2006 this survey was restricted to two viruses of Hosta; in 2007 it was expanded to include fifteen perennial genera and a suite of twelve viruses and in 2009 it was repeated and expanded slightly to include sixteen perennial genera and thirteen viruses. Plants were sampled directly from shipments from the Netherlands at several nurseries in Michigan during the spring. Of the plants tested in 2009, 23% were positive for virus. Ten out of the 16 host genera tested were positive for virus. The strongest host-virus relationship was between *Iris* and *Freesia* having a 50% infection rate with the Potyvirus group. This survey data is critical as we look at the effectiveness of the Dutch Preclearance Program which is negotiated between USDA and the Dutch inspection agencies annually. This data is valuable in assessing the effectiveness of the current program and to make adjustments to the work plan as tolerance levels for various diseases and species are established and revised. Finally, this information is valuable to share with other plant pest safeguarding agencies such as NPDN, and the National Plant Board as we strive to understand the prevalence and importance of various diseases associated with imported material.

P-68 Review of pest flies (Diptera: Tephritidae, Drosophilidae) detected in California from 2004 to present

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Detections of pest Diptera from 2004 to present are mapped and reviewed, mainly tephritid fruit flies, but with the exception of the recent introduction of a species of drosophilid vinegar fly. Overall, these flies feed on more than 250 kinds of fruit, resulting in spoilage and making fruit unfit for consumption. California is in a constant state of alert for fly finds, because they can cause enormous amounts of damage to California and US agriculture. The following fruit flies have been detected since 2004: *Anastrepha ludens* (2004; 2005; 2006; 2007; 2008; 2009), *A. obliqua* (2004; 2005), *A. suspensa* (2004), *Bactrocera albistrigata* (2009–first New World record), *B. correcta* (2004; 2005; 2006; 2007; 2008; 2009), *B. cucurbitae* (2004; 2006), *B. dorsalis*-complex (2004; 2005; 2006; 2007; 2008; 2009), *B. scutellata* (2009), *B. zonata* (2006; 2007; 2009), *Ceratitis capitata* (2004; 2005; 2007; 2008; 2009). For *Ceratitis capitata*, the following biotypes were determined: 2004 (AAA-), 2005 (AAAB, AABB), 2007 (AAAB, AABB, BBBB), 2008 (AAAA, AAAB), 2009 (AAAB). Going back to 1998, the following additional species have been detected: *Anastrepha striata*, *Bactrocera facialis*, *B. latifrons*, and *B. oleae* (since established in the State). Besides tephritids, the Asian drosophilid species *Drosophila suzukii* was found in 27 counties, as well as Oregon and Washington in 2009, with a recent find in Florida. It has been recorded from 10 different soft-skinned fruits in California, predominantly cherry.

P-69 Pro-active crop surveys and strategic sentinel plot placement for pre-emptive cooperative extension programming efforts in Wyoming.

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Reliance on plant sample submission by clients has proven unsatisfactory for most cooperative extension programming efforts related to plant pathology. Plant samples are typically submitted after disease has reached economic significance and often prove too late for alerting producers about managing potential plant problems either in the State or the High Plains region. Pro-active surveys of important crops at optimal times for disease and pest detection enable development of pre-emptive programming efforts that emphasize management of current or anticipated problems. Sentinel plots for various crops also enable focused inspections and early detection of diseases and pests of regional and national concern. Annual surveys conducted in Wyoming typically include diseases of alfalfa, diseases and pests of winter wheat, diseases of dry bean (commercial and seed), and diseases of sugar beet. Strategic sentinel plots placed in production areas typically include alfalfa, bean (dry bean and various), chickpea, maize (field corn and sweet corn), potato, and sugar beet. Diagnosticians and crop inspectors are specifically trained in disease and pest recognition as part of this programming effort. The success of this approach includes cooperative and coordinated efforts of personnel from the University of Wyoming, the Wyoming Seed Certification Service, the Wyoming Department of Agriculture, and the USDA APHIS PPQ CAPS program.

P-70 2009 North Dakota sunflower insect pest survey

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The major insect pest species that cause economic losses to sunflower producers in North Dakota are red sunflower seed weevil, *Smicronyx fulvus* Le Conte (Coleoptera: Curculionidae), banded sunflower moth, *Cochylis hospes* Walsingham (Lepidoptera: Tortricidae), and sunflower midge, *Contarinia schulzi* Gagné (Diptera: Cecidomyiidae). New emerging insect pests include the longhorned beetle, *Dectes texanus* Le Conte (Coleoptera: Cerambycidae), sunflower seed maggot, *Neotephritis finalis* (Loew) (Diptera: Tephritidae), sunflower bud moth, *Suleima helianthana* (Riley) (Lepidoptera: Tortricidae), and lygus bug, *Lygus* species (Hemiptera: Miridae). Sunflower moth, *Homoeosoma electellum* (Hulst) (Lepidoptera: Pyralidae) migrates occasionally into the northern Great Plains production region and can cause severe yield losses. Results of the 2009 sunflower insect pest survey are reported for North Dakota.

P-71 The USDA APHIS PPQ Cooperative Agricultural Pest Survey Program (CAPS)

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The Cooperative Agricultural Pest Survey (CAPS) program focuses on surveying for pests that are not known to occur in the United States. This program is the principle means by which PPQ funds cooperators to conduct survey efforts. In the past, this program focused on specific target pests and, in some cases, particular commodities. In response to a request from our cooperators to bring more flexibility into the program, the program has undergone a change. In 2010, the CAPS program will focus on "bundled" surveys, which emphasize surveying for multiple pests at high-risk sites for efficiency and economy. This approach aims to combine the need to target particular pests while acknowledging that commodities and pathways vary by state or region of the country. The switch to "bundled" surveys should meet the needs of our cooperators by providing more flexible survey options by targeting pests that are likely to establish in their state and at high-risk locations. This also poses several problems in the form of taxonomic support and the need for a variety of traps and lures, identification aids, and diagnostic protocols. In the end, the CAPS program strives to meet the needs of our stakeholders by building connections with both existing and new partners in order to respond to the ever changing landscape of exotic pest detection.

P-72 Palm wilt and other fungi associated with palm dieback in California

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Palm wilt caused by *Fusarium oxysporum* f. sp. *canariensis* is a fatal disease of canary island date palm which can be spread through infected nursery stock. In 2007 the California Department of Food Agriculture (CDFA) Plant Pest Diagnostics Lab began a survey of the distribution of palm wilt disease in California. Samples were received throughout the state from private arborists, CDFA and county agricultural officials. Palm species included *Phoenix canariensis P. reclinata, P. dactylifera* and *P. roebelenii*, with *P. canariensis* representing more than 400 of the 500 total samples. Pathogenic strains of *F. oxysporum* isolated from symptomatic palms were identified using an established PCR protocol. Other fungi associated with vascular discoloration and wilt symptoms were also identified. To date, palm wilt has been confirmed from 12 California counties and from nearly half of the samples received in the survey. Pink rot, caused by *Nalanthamala vermoesenii*, was also isolated frequently, primarily from coastal county samples. Other fungi identified included *Neofusicoccum australe, N. luteum, Botryosphaeria stevensii, Neodeightonia phoenicum, Exserohilum rostratum, Cytospora eucalypticola*, *Phaeomoniella* sp. and multiple species of *Phaeoacremonium*. Many of these fungi are known pathogens of other plant hosts, although most have not been reported on *Phoenix* spp. Experiments to test pathogenicity of some of these fungal species on palm are underway and this survey is ongoing.

P-73 Crushed vehicles: an unusual pathway for the introduction of exotic mollusks

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Invasive-exotic mollusks are of particular concern both ecologically and agriculturally. They displace native species, feed on native plants and agricultural crops. They clog and damage harvesting machinery, their crushed bodies spoil food products and they may carry zoonotic diseases, those transmitted from animals to people. Exotic mollusks, primarily terrestrial snails, can climb into many types of cargo and aestivate allowing them to be overlooked by inspectors since they may be part of non-agricultural shipments. In early 2007 *Granodomus lima*, a terrestrial snail native to Puerto Rico, was intercepted on six occasions from crushed vehicles in a Jacksonville, Florida port, arriving from Puerto Rico. These interceptions prompted the Florida Cooperative Agricultural Pest Survey (CAPS) team to conduct surveys of the maritime port of entry and its environs as well as the processing facility in western Duval County where the cars were destined for meltdown. The objective was to determine if any signs of mollusks, dead or alive, could be found within those environs, including breeding populations.

P-74 Survey of orchid viral diseases on Guam

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The 2 most important viral diseases of orchids worldwide are *Cymbidium* Mosaic Virus (CyMV) and *Odontoglossum* Ringspot Virus (ORSV). Infected plants fail to grow normally, may not flower at all, may produce fewer or discolored, even deformed flowers, and may die prematurely; viral infection may spread from infected to healthy orchid plants by mechanical means. Prior to this study there are no reports of orchid viral diseases on Guam. Lateral flow kits were used to test samples from local nurseries and also from orchids being imported from Thailand, Taiwan, the Philippines, and from the U.S. states of Hawaii and California. Numerous imported samples tested positive for CyMV, some tested positive for ORSV, while a few were positive for both viruses simultaneously, despite their phytosanitary permits. Samples from local nurseries and collections revealed the widespread presence of these viruses in *Cattleya, Cymbidium, Dendrobium,Oncidium, Phalaenopsis* and *Vanda* species. This is the first report of CyMV and ORSV on Guam.

P-75 A survey of South Carolina nurseries for *Phytophthora ramorum* from foliar and soil samples

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Phytophthora ramorum has been detected from nursery stock in South Carolina several times within the last few years and recent trace forwards from West Coast nurseries show that potentially infected plant material was sent to nurseries and homeowners throughout the state. In 2009, the South Carolina Cooperative Agricultural Pest Survey (CAPS) program initiated an intensive statewide survey in order to detect this pathogen before it becomes established in the industry or the environment in South Carolina. Over 100 sites were sampled, with an emphasis placed on nurseries and dealers that receive stock from the West Coast. Host plants exhibiting symptomatic foliage were sampled and accompanied by a soil sample from each pot. Soil was also sampled from landscaped areas within the nursery and in forest environs down slope within ¼ mile of the nursery. The goal of this sampling technique was to enable detection of the pathogen in the soil even if no symptomatic foliage was present. The ELISA test for *Phytophthora* spp. was run on all foliage samples. For foliar samples that tested ELISA positive, nursery soil samples were baited to detect *Phytophthora* species. The results of this *P. ramorum* survey are presented.

CATEGORY: TRAINING AND EDUCATION

P-76 Graduate level diagnostics course taught by NPDN diagnosticians

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Graduate-level training in plant disease diagnostics is not always available in current university plant pathology curricula and most graduate students are not able to easily add an additional full-time class to their schedule. In response to the requests of graduate students at the Department of Plant Pathology at the University of California, Davis who were interested in disease diagnosis, we designed a 1 hour per week seminar class held during the spring quarter of 2009. The objective of the course was to give students practical, hands-on experience in the diagnosis of diseases and other plant problems. Each class included an introduction and short lecture, including useful handouts that were distributed during the first 10─20 minutes of each class. The remainder of the class time was spent examining "unknown" disease samples that pertained to the weekly topic. Course topics included online and library resources, root and crown diseases, how to analyze DNA sequence data, distinguishing the various powdery and downy mildews, identifying common rust genera, virus detection, wilts and canker diseases and quarantines. The course was taught primarily by two CDFA plant pathologists/diagnosticians and a University of California Cooperative Extension Specialist. Overall, the instructors received good student feedback and the course received high student ratings. Several students requested that the course be regularly offered by the department each year.

P-77 Plant biosecurity short courses to enhance agricultural biosecurity training and education at Southern University and A & M College

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There is a need to provide more post baccalaureate training and experiential learning in plant health management at the U.S. land grant universities to counter the potential threat of high consequence plant pathogens whether introduced intentionally or unintentionally that pose a threat to our nation's agriculture. The objective of Plant Biosecurity short courses is to enhance graduate education in plant biosecurity by providing students with firsthand experience in a multidisciplinary, setting with various universities, state and federal agencies involved in plant disease surveillance, rapid identification and detection, and mitigation of high consequence plant pathogens. Some training activities have included field trips to New Orleans, LA to visit the USDA APHIS PPQ Plant Inspections Station, U. S. Customs and Border Protection agricultural inspection at the Port of New Orleans. Students visited collaborators in Pennsylvania to learn more about the Plum Pox outbreak and how this disease impacted industry, also; students visited the BSL-3 containment facilities at the USDA ARS Lab Ft. Detrick, MD to see and discuss research projects on sudden oak death, and other pests and pathogens of national concern. The short course resulted in graduate research project have been initiated in plant biosecurity and increased knowledge and awareness of high consequence plant pathogens and how to respond appropriately.

P-78 Partners in Training: NPDN and Purdue's Plant and Pest Diagnostic Lab

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One of the highest impact outcomes of the NPDN is the depth and quality of training it has generated. Partially supported by NPDN funds, the Purdue Plant and Pest Diagnostic Lab provided training on a variety of topics to growers, homeowners and the extension educators of Indiana in 2008-2009. Specialized training on virus look-alike symptoms was provided in a day-long workshop format for extension educators entitled "Mosaics Mottles and Yellows", which included hands-on work with rapid virus tests along with training in use of portable soil test meters. This 'train-the trainer' session provided educators with a new PowerPoint presentation and materials to assist with additional training sessions within their counties. Extension educators were also provided with hands-on diagnostic training on pests and diseases of agronomic and ornamentals during their annual conference. Distance learning opportunities were offered via IP video sessions using the Polycom platform on topics including fungicide recommendations and clinic sample trends and new problems. Reaching beyond our normal audience in the summer of 2009 we also provided training in plant pathology and diagnostic skills to five visiting scientists from Afghanistan. As part of a collaborative effort with the entomology and weed science departments; the Afghans received 5 weeks of intensive training in plant sciences before returning to Afghanistan to take up faculty positions at Herat University and Kabul University.

P-79 New England small fruit pest issues workshop and tour

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Small fruits are an economically important crop for the six New England states. There are many potential insect, disease and weed problems in small fruit crops that can limit farm profits. With increased movement of insects, diseases, plant materials, and invasive weeds, in addition to the pressures of climate change, the scope of pests causing problems in small fruits is continually expanding. Pest identification skills and knowledge of successful integrated pest management strategies are crucial for the New England specialists working with small fruits and the New England farmers growing these high value crops. UVM received a grant to organize and facilitate a two day meeting inviting a diverse group of diagnosticians, plant pathologists and nematologists with interest in small fruit pests to share information in both a field setting and the conference room. The meeting, held in August of 2009, also would provide an opportunity to form a Small Fruit IPM Working Group and develop IPM priorities for research, extension and education for stakeholders.

P-80 Training Alaska Master Gardeners as First Detectors

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The large state of Alaska boasts a large portion of small, remote communities. With but a few Extension agents and other specialist employees located in only a handful of lager communities, Alaska already relies heavily on Master Gardeners to assist the UAF Cooperative Extension Service detect pest outbreaks. In 2008, the Alaska WPDN developed a First Detector program specifically geared to train Alaskan Master Gardeners to detect pests of high consequence to Alaska. Training goals focus on teaching students to recognize and report abnormal pests while expanding the number of communities with First Detectors. The training is 1½ day long with highlighted topics including: high-risk pest for Alaska, handling specimens, beneficial insects, and insect and disease identification. The program utilizes presentations, hands on activities and guest agency speakers. Master Gardeners have been training in two communities so far and plans are in the works to expand the program to other locations.

P-81 NPDN: Delivering first detector training through eLearning

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A crop biosecurity eLearning program was released during April of 2008. Module topics included: 1) the mission of the NPDN 2) monitoring for a high-risk pests 3) diagnosing plant problems 4) submitting diagnostic samples 5) photography for diagnosis and 6) disease and pest scenarios. Learners login to the NPDN training site (http://cbc.at.ufl.edu/) and complete the modules at their convenience. Once learners have completed all module post-quizzes at the 70% level or higher, they may print their own certificate of completion. As of September 2009, 212 to 371 learners successfully completed individual modules, and at least 150 completed the entire crop biosecurity course. The NPDN training and education subcommittee reviews the modules annually, in addition to updating content as needed in regards to broken weblinks, updating the select agent list, and other appropriate needs. Two new special topic modules, *Ralstonia solanacearum* race 3, biovar 2, and chilli thrips, *Scirtothrips dorsalis* were developed as part of other collaborative projects, and released as NPDN eLearning modules in 2009. The NPDN training and education subcommittee plans to complete the following by December 2009: 1) release a revised NPDN training and education web portal 2) submit core NPDN eLearning modules to the Certified Crop Advisors (CCAs) for national CEUs and 3) produce a promotional video segment and/or narrated webinar on the eLearning program.

P-82 SPDN: Educational Efforts to Enhance Regional Entomology Diagnostics

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The SPDN entomology committee promotes the early detection of exotic pests and accurate diagnostics through enhanced, taxonomic training opportunities. Since 2007, the SPDN entomology committee has organized the following workshops: invasive arthropod workshop; mite taxonomic training, and a scale insect identification workshop for Puerto Rico. The mite taxonomic training and scale identification workshop accommodated 25 and 23 participants, respectively. Participants utilize information from these workshops to improve: self-sufficiency in screening; their abilities to make recommendations based on correct identification; and produce higher quality

slide-mounted specimens. The invasive arthropod workshop was not as intensive from a taxonomic perspective, but provided approximately 60 participants with a broad-based perspective on important pest taxa for the southern region. Examples of new state detections that have occurred from clinics and/or attendees of SPDN workshops include: chilli thrips, *Scirtothrips dorsalis,* in Alabama (2009) and Texas (2007); pink hibiscus mealybug, *Macconellicoccus hirsutus*, in Texas (2007) and South Carolina (2009); Asian citrus psyllid, *Diaphorina citri*, and *Diaprepes abbreviates* in Louisiana (2008), brown marmorated stinkbug, *Halyomorpha halys*, in Tennessee (2009); and hops aphid, *Phorodon humili,* European paper wasp, *Polistes dominula*, and a scale insect, *Lepidosaphes pini* in North Carolina (2007-09).

P-83 NPDN: Delivering first detector training through workshops, webinars, and wiki web page content for master gardeners

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The NPDN training and education subcommittee promotes the early detection and accurate diagnosis of exotic and/or limited distribution pests of concern through first detector extension programming. Over 9,000 first detectors have been trained (2003-09). Training workshops, typically led by local state coordinators or specialists, have been conducted in every state. Local coordinators utilize the NPDN training website (http://cbc.at.ufl.edu/), released in July of 2007, to upload workshop and participant information either pre-or post-conference. The subcommittee launched a First Detector Educator award in 2009 to recognize the outstanding contributions of local coordinators. Registered first detectors receive the monthly NPDN first detector newsletter, and a certificate of completion. Educational material development support by the subcommittee currently includes: 6 core and 11 special topic PowerPoint modules; as well as Bugwood Wiki Master Gardener fact sheets covering 25 plant pathogens, 35 arthropods, and 25 weeds. Much of NPDN's local, regional, and national training is accomplished via partnerships with other related organizations. During 2008, partnerships were emphasized through a national 2-part training webinar attended by 90 locations and 32 U.S. states and/or territories. Collaborative partnership efforts have also resulted in educational booths at various national conferences, national pest alerts, and field identification decks.

P-84 Preparing North Dakota for soybean rust

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Soybean rust, caused by *Phakopsora pachyrhizi* , is one of the most damaging diseases to soybeans in the world. Since the pathogens introduction to the United States in 2004, the disease has survived winter in the Gulf-states and spread north annually. Early detection is critical for management of the disease; however, visual detection at low disease severity is difficult. North Dakota plants approximately four million acres of soybeans annually, however, few agricultural personnel have been trained to identify or manage soybean rust. Thirty five agricultural professionals, consisting primarily of crop consultants and North Dakota State University Cooperative Extension Service personnel, traveled to the University of Florida's North Florida Research Extension Center in Quincy, FL to attend a 1 ½ day Soybean Rust Short Course. The course focused primarily on identification and management of the disease. To assess learning, participants were asked to describe their confidence in identifying and managing soybean rust in a pre- and post- course survey. On a one to five scale (1 = not confident to 5 = very confident), the confidence to identify soybean rust increased from a mean of 2.3 to 4.2 and the confidence to

determine if a fungicide application was warranted increased from 2.2 to 4.4. An increase in confidence to all questions asked was observed and will be presented.

P-85 Virtual "Plant, Pests, and Pathogens" sessions at North Carolina State University

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NC State University uses the Elluminate internet platform for synchronous distance learning sessions. In the summer of 2009 members of the Departments of Horticultural Science, Plant Pathology, and Entomology used this technology to conduct four monthly "Plants, Pests, and Pathogens" sessions for Master Gardeners and County Extension Agents. The two-hour sessions started with updates on pest and disease problems from two or three selected County Agents. Sessions also included updates from the Plant Disease and Insect Clinic and a presentation on a topic of general interest. An average of 171 people, representing a total of 34 counties, participated in each session. There were several advantages of Elluminate over the satellite-based program of previous years. Time was slightly more flexible, higher quality images could be selected beforehand, and there was no need for participants to travel to a special studio. Two-way communication during the sessions was conducted via a chat box, a very engaging quizzing tool, and occasionally by audio. Sessions were archived and can be accessed on-line. The time needed to prepare presentations was the main disadvantage. Also, incoming questions sometimes lagged behind the speaker's presentation. Our use of video was limited because of concerns about lack of bandwidth. It was important to have technical support and an experienced moderator, but the program ran very smoothly in the first year using this technology.

P-86 Integrated community outreach programming to prevent spread of pine wilt into western Kansas

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Phytopathology 99:S63

Pine wilt, caused by the pinewood nematode (*Bursaphelenchus xylophilus*) is a fatal disease that is a threat to *Pinus nigra* and *P. sylvestris* windbreaks, conservation plantings, and landscapes in western Kansas. Pine wilt was discovered in 1979 in extreme southeast Kansas. The disease has moved west at approximately 10 miles per year, killing thousands of pines, and is now present approximately halfway across the state. We have developed an integrated Pine Wilt Initiative to disseminate information about pine wilt in communities directly along the leading edge of disease and beyond. Timely sanitation (removal and destruction of infected pines) will reduce the likelihood of establishment in western KS plantings, where tree resources are scarce and thus highly valued. We have developed printed materials in English and Spanish (to reach a growing Spanish-speaking population in southwest Kansas). We have held several community-based workshops with homeowners, arborists, and city foresters to raise awareness of pine wilt and train them as early detectors. The program closely integrates university, forest service, regulatory, and county personnel in addition to private tree care professionals and private landowners.

P-87 *Rathayibacter toxicus*, select agent

Putnam, M.* Botany and Plant Pathology, Oregon State University, Corvallis, OR

Rathayibacter toxicus was added to the list of select agents by the USDA APHIS in October, 2008. This actinomycete causes gumming disease and ryegrass toxicity which can result in neurological disorders or fatal poisoning of sheep and cattle that ingest infected grasses. The toxins produced by *R. toxicus* are lethal for all animal species that have been experimentally tested. The threat of this agent is primarily to livestock, although there is also some concern about potential human ingestion of contaminated foodstuffs. The disease is known to occur in several plant genera, including but not limited to *Lolium*, *Polypogon*, and *Agrostis.* The disease cycle and following toxin production involves vectoring of the actinomycete by seed and leaf gall nematodes (*Anguina* spp.) during their migration from galls. The actinomycetes colonize the inflorescence, eventually producing corynetoxins and a yellow gummosis as the plant matures. The toxins produced are poorly immunogenic and there is no natural immunity in animals. The pathogen is widely distributed in Australia where it was first

reported, but is not known to be established in the U.S. A Standard Operating Procedure for detection and response is being developed as part of the NPDN Diagnostics Subcommittee activities.

P-88 Maryland First Detector training: Partnerships and innovations

Rane, K.K.*, Clement, D.L., Malinoski, M.K., and Gill, S. Dept. of Entomology, University of Maryland, College Park, MD; and Home and Garden Information Center, Central Maryland Research and Education Center, University of Maryland Extension, Ellicott City, MD

Maryland is a diverse state in geography (mountains to seashore) and plant species (both southern and northern native flora).The presence of a vibrant green industry and active port city result in extensive movement of a wide variety of ornamental plants. These factors make Maryland vulnerable to repeated introductions of invasive insects, weeds and plant pathogens. In the past 10 years, detections of quarantine pests include emerald ash borer, chrysanthemum white rust, *Ralstonia solanacearum*, and *Phytophthora ramorum*. Educational programs on identifying invasive organisms have been the focus of various groups in the state, including University of Maryland Extension and state and federal regulatory personnel. Maryland's NPDN representatives have partnered with these groups to develop and conduct First Detector training activities aimed at pests and diseases of ornamental crops. These efforts include hands-on workshops, web-based information sites, and on-line webinars for Master Gardener and green industry audiences.

P-89 Innovative ways to educate ourselves and our clientele: examples from Montana

Skoglund, L.G.* and Burrows, M.E. Department of Plant Sciences and Plant Pathology, Montana State University, Bozeman, MT

As diagnostic labs seek to remain relevant to our changing consumer base, we must educate not only ourselves. We must educate our clientele to recognize pests and submit them for proper diagnosis and science-based management recommendations. In 2008, Montana State University hosted an online seminar series for diagnosticians in GPDN. One speaker was nominated from each state and gave a one hour Adobe Connect seminar on topics of interest to our region. In 2009 this was expanded to include topics of national interest. In 2010 we plan on hosting the seminar series again, with a theme of 'IPM of pests' to address the needs of Montana's urban IPM stakeholders and the NPDN as a whole. These seminars will be promoted as training opportunities for participants in Montana's Urban IPM program, and used as training materials for extension activities in other states. Other bridge activities between the GPDN and MSU's extension program include an invasive pest calendar. This calendar featured 12 plant diseases, insects, and weeds that threaten urban ecosystems in Montana. This has been used as a model to educate rural growers with a stakeholder-supported calendar for management of common wheat pests. Combining our extension and diagnostic skill sets, we have replicated several successful activities to address diverse stakeholder needs.

NPDN would like to thank the following exhibitors for participating in this year's meeting.

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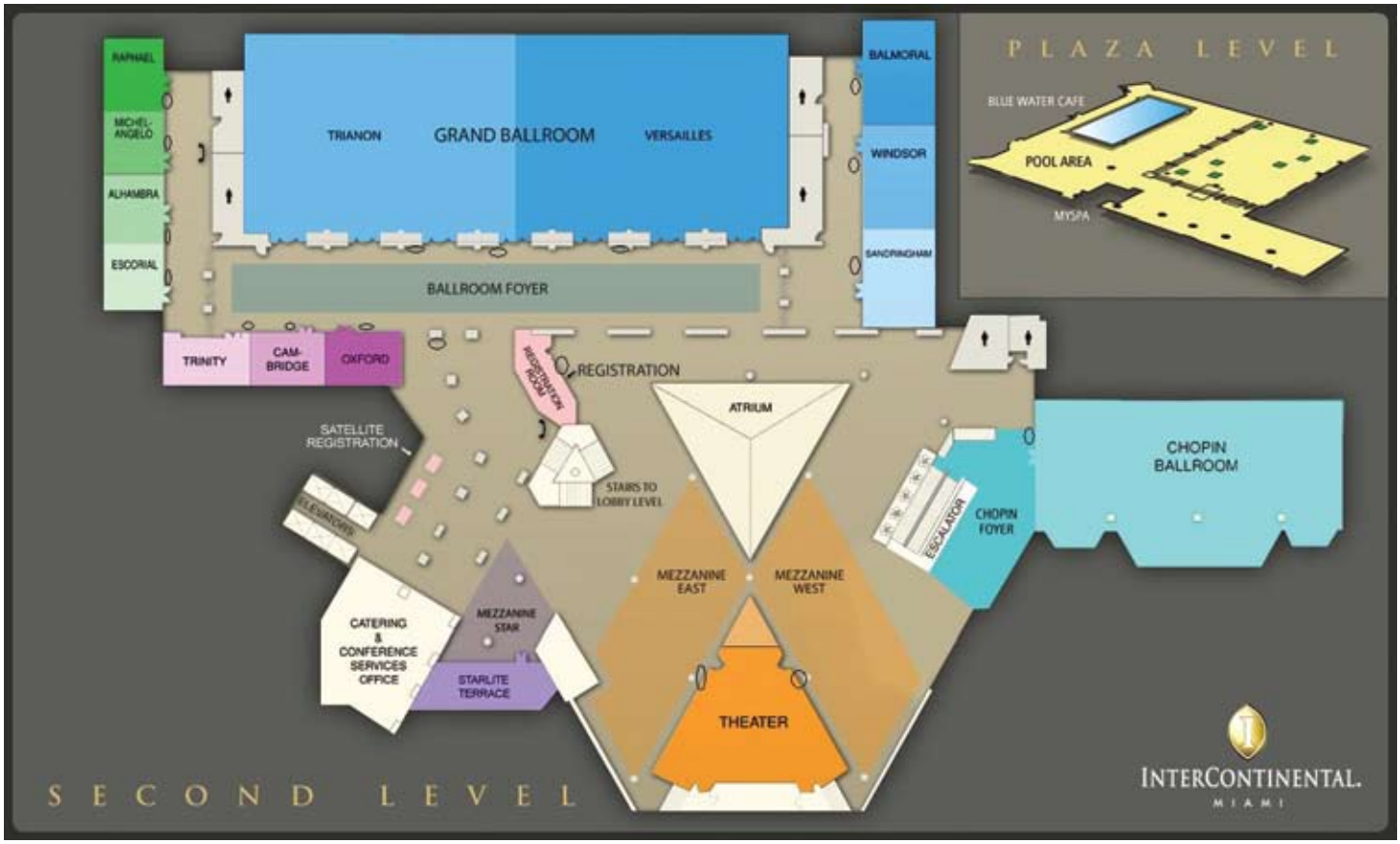
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