NPDN

NATIONAL PLANT DIAGNOSTIC NETWORK

7TH NATIONAL MEETING

SEPT. 9-13, 2024 | PORTLAND, ME

ADAPTING TO THE CHALLENGES OF CHANGE

NPDN | 2024 NATIONAL CONFERENCE

NATIONAL PLANT DIAGNOSTIC NETWORK

Monday

- 8:00 AM – Leadership Meeting, 8:00 am – noon
- 1:00 PM – Committee Meetings, Session A, 1:00 – 2:30 pm
- Refreshment Break
- 3:00 PM – Committee Meetings, Session B, 2:45 – 4:15 pm
- 6:00 PM – Regional Meetings, 6:00 – 8:00 pm

Tuesday

- 7:00 AM – Breakfast, 7:00 – 7:45 am
- 8:00 AM – General Session, 8:00 – 9:30 am
- Refreshment Break
- 10:00 AM – General Session, 10:00 am – noon
- 12:00 PM – Lunch, Noon – 1:30 pm
- 1:00 PM – General Session, 1:30 – 3:30 pm
- 3:00 PM – Poster Session with Exhibitors, 3:30 – 5:30 pm
- 6:00 PM – Banquet, 5:30 – 7:30 pm

Wednesday

- 7:00 AM – Breakfast, 7:00 – 7:45 am
- 8:00 AM – General Session, 8:00 – 9:30 am
- Refreshment Break
- 10:00 AM – General Session, 10:00 – 11:00 am
- 11:00 AM – Lunch, 11:00 am – 12:30 pm
- 1:00 PM – General Session, 12:30 – 2:00 pm
- Refreshment Break
- 3:00 PM – General Session, 2:30 – 4:45 pm
- 6:00 PM – Peaks Island Excursion or Informal Poster and Exhibitor Session

Thursday

- 8:00 AM – Bacterial Basics, 8:00 – 10:00 am
- 10:00 AM – Fungal Basics, 10:15 am – 12:15 pm
- 1:00 PM – Micro Lepidoptera, 1:15 – 3:00 pm
- 3:00 PM – Eriophyid Mites, 3:15 – 5:00 pm
- Acadia National Park Tour, 6:30 am – 5:30 pm

Friday

- 8:00 AM – Fusarium, 8:00 – 10:00 am
- Refreshment Break
- 10:00 AM – Fusarium (cont.), 10:15 am – noon
- 1:00 PM – Emerging Insects, 1:00 – 3:00 pm
- 3:00 PM – Phytophythium Comparison, 3:15 – 5:15 pm
- Wild Blueberry Tour, 8:00 am – 5:00 pm

WELCOME

NPDN seventh national meeting

LETTER FROM NPDN EXECUTIVE DIRECTOR

Welcome to the seventh National Meeting of the National Plant Diagnostic Network. Welcome to NPDN members, to our partners, collaborators, cooperators, and guests. For this meeting we are thrilled to be gathering in beautiful Portland, Maine, and to be hosted by the Northeast Plant Diagnostic Network.

As a network - as a successful national extension program - NPDN is now in its third decade of contributing to the productivity and security of US agriculture and horticulture and the protection of its native flora and green spaces.

In the two years since the sixth national meeting our members have done a huge amount of work, under sometimes difficult circumstances, to deliver real progress in the key areas: accreditation, professional development, and proficiency, all while we have continued to deliver first class diagnostic services to our diverse clientele and stakeholders. YOU, the membership, should be incredibly proud of what you have achieved in the last two years. Take the time while we are gathered together to celebrate each other's accomplishments.

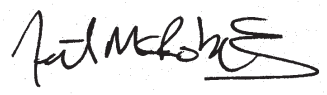
During the same period, members of the leadership team have devoted time and effort to advocacy for NPDN with USDA and the legislature. Educating the legislature about the important role that NDPN fulfills is a strategic activity that will, we hope, lead to long term support for our work. I want to acknowledge the American Phytopathological Society for their continuing partnership in these advocacy efforts and the resources they make available to NPDN to facilitate conversations in Washington, DC.

NPDN is valued not only for the networked diagnostic expertise that we provide as our core function, but increasingly by our national and international collaborators, for our experience in building and maintaining complex collaborative networks, and our institutional knowledge of biosecurity issues. In 2023 NPDN was recognized by the National Plant Board as a highly valued partner through the presentation of an award at the NPB Annual Meeting in Little Rock, AR.

There is much, then, for us to celebrate and to build upon as we gather for another national meeting. There will be conversation, discussion, and exchange of ideas. Progress will no doubt be made on existing collaborations, and hopefully some new ones will begin. There will be awards (what would a national meeting be without the "Rotten Tubers"?) and individuals will be recognized for their achievements and their service. In addition to the two days of general sessions there are two days filled with an abundance of workshops and field trips, and, of course, the location of Portland itself to be explored and enjoyed.

Thank you to the program committee and local organizing team for putting together such a stimulating and eventful program.

I wish you all a happy and productive meeting.



Neil McRoberts, Executive Director, National Plant Diagnostic Network

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The 2024 program book was designed and edited by Allina Bennett.
Thank you to those who created the 2022 program book, used as a template: Lindsey Ashmore, Clarissa Balbalian, Matt Bertone, Martin Deubler, Judy Dizon and Eleanor Lopez.
The front cover was created by MyCali Designs with design input from Communications Committee.

THE FIVE REGIONS OF NPDN

1. NEPDN NORTHEAST PLANT DIAGNOSTIC NETWORK
2. GPDN GREAT PLAINS DIAGNOSTIC NETWORK
3. SPDN SOUTHERN PLANT DIAGNOSTIC NETWORK
4. NCPDN NORTH CENTRAL PLANT DIAGNOSTIC NETWORK
5. WPDN WESTERN PLANT DIAGNOSTIC NETWORK

PROGRAM AGENDA

Monday, September 9

8:00am – 12:00pm
Leadership Business Meeting
LOCATION: Rhines A

12:00pm – 6:30pm
Pre-Meeting Check-In
LOCATION: Lobby

1:00pm – 2:30pm
Committee Meetings Session A

- **Proficiency Committee**
  LOCATION: Sarah Orne
- **Protocols and Validation Committee**
  LOCATION: Longfellow
- **Accreditation Committee**
  LOCATION: Rhines A

2:30pm – 2:45pm
Refreshment and networking break
LOCATION: Pre-Function Space

2:45pm – 4:15pm
Committee Meetings Session B

- **Professional Development Committee and DEIA Working Group**
  LOCATION: Rhines A
- **Regulatory Relations Committee**
  LOCATION: Longfellow
- **Communications Committee**
  LOCATION: Sarah Orne

6:00pm – 8:00pm
Regional Meetings:

GPDN - Sarah Orne
NCPDN - Rhines A
NEPDN - Meet in Westin lobby
SPDN - Winslow Homer
WPDN - Longfellow

Tuesday, September 10

LOCATION: All general sessions and meals will be held in the Eastland Grand Ballroom

7:00am – 7:45am
Breakfast

7:00am – 4:30pm
Meeting Check-In
LOCATION: Lobby

Morning Moderator: Jim Stack

8:00am – 8:10am
Dr. Hannah Carter, Dean of Cooperative Extension, University of Maine
Welcome to Maine

8:10am – 8:25am	**Dr. Neil McRoberts,** NPDN Executive Director, University of California, Davis Welcome to the 7th National Meeting
8:25am – 9:00am	**NPDN DEIA Working Group: Ansuya Jogi, Jenny Glass, Todd Steinlage, Dr. Chelsea Harbach, Dr. Stephanie Shea, Dr. Safira Sutton** Cultivating Inclusivity: A DEIA Conversation for the NPDN
9:00am – 9:15am	**Dr. Amer Fayad,** National Program Leader, NIFA An Overview of NIFA Strategic Goals and Funding Opportunities
9:15am – 9:30am	**Piera Siegert,** State Plant Regulatory Official, New Hampshire and National Plant Board Vice President Strengthening the Relationship between the NPDN and National Plant Board
9:30am – 10:00am	***Refreshment and networking break, poster and exhibitor space open*** LOCATION (posters): Balcony (exhibitors): Ballroom
10:00am – 10:15am	**Joe LaForest,** Associate Director for the Center for Invasive Species and Ecosystem Health (Bugwood) and Co-Director for the Southern IPM Center, University of Georgia IPM Center Resources that Fit NPDN
10:15am – 10:45am	**Dr. Vessela Mavrodieva,** USDA-APHIS-PPQ-S&T, PPCDL APHIS PPDCP and NPDN: Partners in Regulatory Plant Diagnostics
10:45am – 12:00pm	**Robin Choudhury, Mike Hill, and Angel Saavedra** Adapting data tools to serve NPDN diagnosticians and stakeholders
12:00pm – 1:30pm	***Lunch: Meeting buddies, poster and exhibitor space open*** LOCATION (meeting buddies): Sarah Orne LOCATION (posters): Balcony (exhibitors): Ballroom

Afternoon Moderator: Neil McRoberts

1:30pm – 3:00pm	**Panel: Cassandra Bates, Dr. Cheryl Blomquist, Dr. Tom Creswell, Jenny Glass, Laura Miles, and Dr. Stefanie Rhodes** Evolving Technology: From Legacy to Cutting-Edge
3:00pm – 3:30pm	**Dr. Carrie Harmon,** SPDN Co-Director, University of Florida NPDN and DAVN: Focusing on the Future

Lightning Round and Awards Moderator: Raj Singh

3:30pm – 5:30pm	***Poster and exhibitor space open with refreshments, 5-minute Lightning Round Talks*** LOCATION (posters): Balcony (exhibitors): Ballroom
5:30pm – 7:30pm	***Dinner, Awards and Recognitions***

Cash Bar available between 3:30 - 7:30pm

Wednesday, September 11

Ferry tickets for the Peak's Island Evening Trip must be picked up between 7am and 2:30pm at the registration table.

7:00am – 7:45am	**Breakfast**

Morning Moderator: Jeff Jones

8:00am – 8:45am	**Dr. Alicyn Smart and Dr. Jan Byrne** Success stories, stakeholders, and 20 years of NPDN impacts
8:45am – 9:30am	**Michelle Vázquez Jacobus, J.D.,** Associate Professor of Social and Behavioral Sciences, University of Southern Maine Let's Talk Roots: Communicating about plants with their people
9:30am – 10:00am	***Refreshment and networking break, cluster conversation, poster and exhibitor space open*** LOCATION (cluster conversation: Life/Work Balance): Sarah Orne LOCATION (posters): Balcony (exhibitors): Ballroom
10:00am – 11:00am	**Dr. Tania Brenes-Arguedas and Dr. Carrie Harmon** I've uploaded all this data to the NPDN National Data Repository. So what?
11:00am – 12:30pm	***Lunch: Rotten Tuber Awards followed by networking with poster and exhibitor space open*** LOCATION (posters): Balcony (exhibitors): Ballroom

Afternoon Moderator: Megan Kennelly

12:30pm – 1:00pm	**Dr. Peter DiGennaro,** Assistant Professor of Nematology, University of Wisconsin, Madison Plant Parasitic Nematode Identification with Machine Learning
1:00pm – 2:00pm	**Dr. Carrie Harmon, Dr. Sladana Bec, Dr. Nick Goltz, Dr. Chelsea Harbach, and Dr. Peng Tian** Panel: Feeding the Professional Pipeline: Building Future Diagnosticians in a Changing World
2:00pm – 2:30pm	***Refreshment and networking break, NPDN Connections Map*** LOCATION (posters): Balcony (exhibitors): Ballroom
2:30pm – 4:00pm	**Dr. John Bonkowski, Dr. Fulya Baysal-Gurel and Dr. Roger Magarey (VSD)** **Elizabeth Dorman and Aimee Hyten (Bacterial Wilt)** New pests and old problems: detection and diagnosis of Vascular Streak Disease and Bacterial Wilt
4:00pm – 4:30pm	**Dr. Tania Brenes-Arguedas and Dr. Stephanie Shea** NPDN Annual Lab Capacity and Impact Evaluation History and Results
4:30pm – 4:45pm	**Dr. Neil McRoberts and Dr. Alicyn Smart** Passing the gavel and closing comments
5:00pm – 8:30pm	***Peaks Island Excursion (dinner at 6:30pm, last ferry to the island leaves at 5:35pm)*** **Pick up Ferry Tickets by 2:30pm* *Poster and exhibitor space open during this time.*

ASSOCIATED PROGRAMS

Workshops and Field Trips

Thursday, September 12

6:30am – 5:30pm	**Acadia National Park Tour: Aaron Bergdahl** DEPARTURE POINT: Westin Portland Harborview parking lot DEPARTURE TIME: 6:30 am Boxed breakfast and lunch provided
7:00am – 7:45am	***Breakfast available for Bacterial Basics workshop participants*** LOCATION: Longfellow
8:00am – 10:00am	**Bacterial Basics: Dr. John Bonkowski, Dr. Nick Goltz, and Dr. Alicyn Smart** LOCATION: Winslow Homer
10:00am – 10:15am	***Break***
10:15am – 12:15pm	**Fungal Basics: Dr. Megan Romberg** LOCATION: Winslow Homer
12:15pm – 1:15pm	***Lunch (on your own)***
1:15pm – 3:15pm	**Micro Lepidoptera Specimen Preparation Techniques and Identification: Dr. Jason J. Dombroskie** LOCATION: Winslow Homer
3:00pm – 3:15pm	***Break***
3:15pm – 5:00pm	**Sampling and Identifying Eriophyid Mites: Dr. Matt Bertone** LOCATION: Winslow Homer

Friday, September 13

8:00am – 5:00pm	**Wild Blueberry Tour: Dr. Lily Calderwood and Dr. Seanna Annis** DEPARTURE POINT: Westin Portland Harborview parking lot DEPARTURE TIME: 8:00 am Boxed breakfast and lunch provided
7:00am – 7:45am	***Breakfast available for Fusarium workshop participants*** LOCATION: Longfellow
8:00am – 10:00am	**Fusarium for Busy People: Dr. David Geiser** LOCATION: Winslow Homer
10:00am – 10:15am	***Break, refreshments provided for Fusarium workshop participants*** LOCATION: Longfellow
10:15am – 12:00pm	**Fusarium for Busy People (continued): Dr. David Geiser** LOCATION: Winslow Homer
12:00pm – 1:00pm	***Lunch (on your own)***
1:00pm – 3:00pm	**Emerging Insect Pests from Each Region: Gary Fish and Cheryl Copeland** LOCATION: Winslow Homer
3:00pm – 3:15pm	***Break***
3:15pm – 5:15pm	**Comparison of Phytopythium with Phytophthora and Pythium: Dr. Alejandro Rojas and Austin McCoy** LOCATION: Winslow Homer

Welcome New Members!

Since the last meeting, there have been over 100 new member accounts and/or roles established. Most of these represent new NPDN members. Please join us by welcoming them to the NPDN family by keeping an eye out for the blue "New to the NPDN" ribbon on their name tag and introducing yourself.

Grace Anderson, NCPDN
Hannah Ayala, SPDN
Jesse Bamba, WPDN
Jacki Beacham, WPDN
Gabriela Benito, WPDN
Allina Bennett, SPDN
Ruby Bonilla, NEPDN
Lara Brown, WPDN
Samuel Brown, WPDN
Richard Buckley, NEPDN
Wendy Cecil, GPDN
Predeesh Chandran, SPDN
Carlton Collins, SPDN
Matthew Cullen, NCPDN
Santina Cullison, NCPDN
Christian Cumagun, WPDN
Sandesh Dangi, GPDN
Bradley Deering, NCPDN
Sapphitah Dickerson, WPDN
Alec Dunker, SPDN
Tyler Edwards, NEPDN
Erin Gunnink-Troth, GPDN
Alicia Estell, NCPDN
Jesus Estoque, WPDN
Lillian Gannon, NEPDN
Dhiraj Gautam, WPDN
Laban Goolsby, SPDN
Jenna Gortari, WPDN
Rich Guggenheim , GPDN
Ying Guo, WPDN
Subhas Hajeri, WPDN
Chelsea Harbach, NCPDN
Walker Hedrick, WPDN
Gabriel Herrera, SPDN
Raquel Hill, SPDN
Rosa Jaime Frias, WPDN
Elena Karlsen-Ayala, NEPDN
Ronan Keener, NCPDN
Megan Kennelly, GPDN
Rosalee Knipp, NCPDN
Sarah LaFramboise, GPDN
Addison Leigh, WPDN
Patrick Liesch, NCPDN
Bo Liu, NEPDN
Olive LoGrasso, GPDN
Alejandra Jimenez Madrid, SPDN
Esneider Mahecha, NCPDN
Olesya Malakhova, SPDN
Marcus Marin, SPDN
Josiah Marquez, WPDN
Michelle Martin, WPDN
Cora McGehee, SPDN
Micheal Melchert, WPDN
Therese Miller, NCPDN
Felicia Millett, NEPDN
Israfiel Mohammed, WPDN
Sylvia Moraes, SPDN
Judy O'Mara, GPDN
Mana Ohkura, WPDN
Mary Ortiz-Castro , GPDN
Jesse Ostrander, USDA
Wren Padua, NEPDN
Archana Pal, SPDN
Laxmi Pandey, SPDN
Darren Park, WPDN
Tony Patino, WPDN
Jason Pavel, SPDN
Lainey Phan, WPDN
Katie Posis, WPDN
Bindu Poudel-Ward, WPDN
Nar Ranabhat, SPDN
Chloe Rice, GPDN
Olivia Rist, NEPDN
Marni Rolston, GPDN
Francesca Rotondo, NCPDN
Kyoko Scanlon, NCPDN
Zach Schumm, NCPDN
Madalyn Shires, GPDN
Caitlin Sollazzo, SPDN
William Stump, GPDN
Safira Sutton, Industry
Eliana Tauger, NEPDN
Jacob Taylor, SPDN
Aimee Thapa, GPDN
Lindsey Thiessen, USDA
Sophie Usher, SPDN
Jessica Velte, SPDN
Joseph Viglienzoni, WPDN
Kristen Wickert, NEPDN
Nicholas Winarto, WPDN
Jordan Withycombe, SPDN
Patrick Woods, WPDN
Brooke Zale, USDA
Lili Zhang, NCPDN

ORAL ABSTRACTS

S01 | CULTIVATING INCLUSIVITY: A DEIA CONVERSATION FOR THE NPDN

NPDN DEIA Working Group (Jenny Glass, Dr. Chelsea Harbach, Ansuya Jogi, Dr. Stephanie Shea, Todd Steinlage, Dr. Safira Sutton)

To ensure that the NPDN is appropriately and effectively supporting our membership, it is imperative that we continue to provide safe spaces for conversations and efforts related to Diversity, Equity, Inclusion, and Accessibility (DEIA). The NPDN DEIA Working Group is committed to continually learning about the needs of our members to help steer our priorities. We plan to work collaboratively with NPDN Committees and Leadership to share insight, data, and resources and provide input on events, policies, and surveys. Our ultimate aim is to cultivate inclusivity, promote accessibility and equity, and advance diversity initiatives within the network.

You may reach out to the DEIA Working Group at deia@npdn.org.

S02 | AN OVERVIEW OF NIFA STRATEGIC GOALS AND FUNDING OPPORTUNITIES

Dr. Amer Fayad

The National Institute of Food and Agriculture (NIFA) is the extramural funding agency at the U.S. Department of Agriculture. NIFA invests in and advances agricultural research, education, and extension to solve societal challenges. NIFA programs support innovation across the nation through transformative discoveries, education, and engagement that address agricultural challenges including critical and emerging issues in agriculture and food systems. The presentation will cover NIFA's Strategic Goals (2022-2026) and funding opportunities relevant to agricultural biosecurity and the National Plant Diagnostic Network.

S03 | STRENGTHENING THE RELATIONSHIP BETWEEN THE NPDN AND THE NATIONAL PLANT BOARD

Piera Siegert

The NPDN and NPB organizations recognize the importance of working together for detection of regulated pathogens. There are opportunities to strengthen existing working relationships between the NPDN and NPB. A recent MOU was signed between the NPDN and the NPB to provide data access to the NPDN database for SPROs. There is a current strategic alliance strategic initiative that looks more broadly at data accessibility and accuracy for state and federal partners with regulatory authorities.

This presentation will give background on the National Plant Board, current initiatives about data, and working between NPDN labs and State Plant Regulatory Officials (SPROs). A focus on emphasizing communication during a regulatory response.

Learn more at nationalplantboard.org.

S04 | IPM CENTER RESOURCES THAT FIT NPDN

Joe LaForest

Diagnostics are the foundation of any Integrated Pest Management (IPM) Program. As a result, the regional IPM Centers funded by the USDA NIFA Crop Protection and Pest Management Program (CPPM) have resources available to support developing and implementing quality diagnostics, professional development, and communication. This presentation will highlight the grants, online resources, and services the IPM Centers offer along with updates on current collaborations with NPDN.

S05 | APHIS PPDCP AND NPDN: PARTNERS IN REGULATORY PLANT DIAGNOSTICS

Dr. Vessela Mavrodieva

The Plant Pathogen Diagnostics Certification Program serves to build lab capacity for USDA PPQ regulatory diagnostic testing nation-wide and to support quality management and continual improvement in partnering labs. PPDCP certifications for common molecular diagnostic methods and assay results interpretation are a tangible demonstration of a lab's commitment to quality and reliable testing. 53 diagnosticians from 21 labs currently participate in the program, many of whom are NPDN members. The PPDCP is now accepting new labs to the program and new diagnosticians from existing partner labs.

S06 | PANEL: ADAPTING DATA TOOLS TO SERVE NPDN DIAGNOSTICIANS AND STAKEHOLDERS

Mike Hill, Angel Saavedra, and Dr. Robin Choudhury

Our panel will focus on how data tools are being adapted to serve NPDN and provide benefits to all members of the network. It will describe the evolution of tools that have been developed over the years and how these tools have been used to provide insights that allow us to better identify trends and outliers in the data. We will also touch on emerging tools and how those are being incorporated to allow us to gain additional insights for the future.

S07 | PANEL: EVOLVING TECHNOLOGY: FROM LEGACY TO CUTTING-EDGE

Cassandra Bates, Dr. Cheryl Blomquist, Dr. Tom Creswell, Jenny Glass, Laura Miles and Dr. Stefanie Rhodes

Diagnostics laboratories within NPDN employ various tools for diagnosing plant health mysteries, ranging from traditional methods like culturing and microscopic observation to specialized techniques detecting pathogens via specific proteins or molecular techniques. Diagnostic challenges differ according to the clientele of the laboratories, even more so in a regulatory context. The investment behind a decision to offer a new service requires a thorough analysis. Factors such as cost, turnaround time, service impact, and personnel capability all play a role in such decisions. This panel will discuss the decision-making intricacies through real-life scenarios.

S08 | NPDN AND DAVN: FOCUSING ON THE FUTURE

Dr. Carrie Harmon

The Diagnostic Assay Validation Network (DAVN) is a NIFA-AFRI-funded project developing tools and resources to coordinate, standardize, and harmonize plant disease diagnostic assay development and validation research and implementation to strengthen plant biosecurity in the U.S. The project is nearing the end of its three-year plan and the PIs have applied for a second project to continue to build useful tools and expand the communities to support validated assay research through implementation in the diagnostic labs. A special focus of the DAVN2.0 is the inclusion of NPDN via a standing liaison and promotion of relevant NPDN Protocol and Validation Committee projects and outputs. This presentation and its poster will summarize current and future projects and opportunities for engagement.

S09 | SUCCESS STORIES, STAKEHOLDERS, AND 20 YEARS OF NPDN IMPACTS

Dr. Alicyn Smart and Dr. Jan Byrne

The impacts of NDPN are challenging to capture. Over 3,000,000 diagnoses, representing 93% of the counties in the US, have been submitted to NPDN's National Data Repository. Behind these numbers are some subtle but significant impacts of the NPDN including professional development, recently hired diagnosticians, upgraded lab equipment, improved diagnostic protocols, IT tools, increased sample capacity and new pest detections. A review of former and ongoing efforts to document impacts will be shared.

S10 | LET'S TALK ROOTS: COMMUNICATING ABOUT PLANTS WITH THEIR PEOPLE

Michelle Vázquez Jacobus, J.D.

Plants play a vital role in our survival. They produce our food, are the basis of essential resources, and our connections to culture and home. Those who work with plants professionally appreciate this crucial role but may find challenges communicating it to the average person: particularly regarding how to keep plants, crops, and gardens healthy and sustainable. As with any communication across cultures, closing the botany divide requires flexibility, openness, and recognition of common ground. As we face the challenges of a changing climate, promoting survival, sustainability, and resilience requires effectively communicating with people about the greenery in their lives. In this talk, we will consider the importance of plants in our homes, occupations, culture, and communities, and sow the seeds of cross-cultural communication to nurture growth and adapt to change.

S11 | I'VE UPLOADED ALL THIS DATA TO THE NPDN NATIONAL DATA REPOSITORY. SO WHAT?

Dr. Carrie Harmon and Dr. Tania Brenes-Arguedas

The NPDN National Data Repository (NDR) is a database that collects diagnostic data from NPDN diagnostic laboratories throughout the USA and its territories. All NPDN funded labs expend great effort to upload diagnostic data regularly, maintain the NDR with the most current information and expand the holdings significantly. But what is the value to the individual lab and diagnostician? And how does all this data fit in the greater scheme of things? This presentation will provide an overview of this database, how it is managed, some national trends, and information on how to maximize the local-level value.

S12 | PLANT PARASITIC NEMATODE IDENTIFICATION WITH MACHINE LEARNING

Dr. Peter DiGennaro

Plant-parasitic nematodes are one of the most important pests of all major cultivated crops, responsible for over 125 billion dollars in yield losses annually; accurate and rapid nematode identification is paramount to informing critical management decisions in agriculture. Identifying plant-parasitic nematodes and abundances allows for informed management recommendations and is a platform for the detection of new and emerging pests that can direct quarantine and sanitation procedures. Here we present an artificial intelligence-based approach to increase the accuracy and throughput of nematode identification for use in Nematode Assay Labs across the country.

S13 | PANEL: FEEDING THE PROFESSIONAL PIPELINE: BUILDING FUTURE DIAGNOSTICIANS IN A CHANGING WORLD

Dr. Carrie Harmon, Dr. Sladana Bec, Dr. Nick Goltz, Dr. Chelsea Harbach, and Dr. Peng Tian

This panel aims to provoke thought and discuss ways to support the development of future diagnosticians. With diverse career paths, panelists will share their journeys to becoming diagnosticians, highlighting the ease and challenges encountered along the way. The discussion will emphasize the importance of internships and hands-on lab experiences, showcasing how these opportunities benefit both graduate and undergraduate students. This panel offers a platform for diagnosticians to share their stories, exchange insights, and discuss strategies to support the next generation of professionals in the field of plant diagnostics. Join us to explore how we can collectively nurture the professional pipeline that sustains the NPDN.

S14 | NEW PESTS AND OLD PROBLEMS: DETECTION AND DIAGNOSIS OF VASCULAR STREAK DISEASE AND BACTERIAL WILT

Dr. John Bonkowski, Dr. Fulya Baysal-Gurel and Dr. Roger Magarey

VSD: Vascular streak dieback (VSD) is an emerging problem in woody ornamentals in nurseries and landscapes. There are a number of challenges with trying to diagnose VSD suspect samples due to the difficulty in isolating the associated *Ceratobasidium* sp. The presenters will discuss multiple methods for the successful isolation and molecular detection of *Ceratobasidium*. Topics will include: symptoms, surface sanitization, incubation, types of growing media, DNA extraction methods, conventional PCR, qPCR, and DNA sequencing.

Elizabeth Dorman and Aimee Hyten

Bacterial wilt: In 2020, *Ralstonia solancearum* r3v2 was detected in geraniums in a Michigan greenhouse. That detection set off a series of regulatory actions in Michigan and beyond. The Michigan Department of Agriculture and Rural Development and USDA APHIS worked closely with the industry to trace, inspect, test, and sample potentially infected plant material. Regulatory impacts of *R. solanacearum* detections deter growers from submitting some ornamental samples; meanwhile labs continue to find endemic *R. solancearum* in unexpected hosts. This session will review the diagnostic techniques used in labs, requirements for reporting, and review how early detection prevents larger economic losses.

S15 | NPDN ANNUAL LAB CAPACITY AND IMPACT EVALUATION HISTORY AND RESULTS

Dr. Tania Brenes-Arguedas and Dr. Stephanie Shea

The NPDN Annual Lab Capacity and Impact Evaluation survey is a questionnaire designed to survey the diagnostic capacity, capability, and contributions of all diagnostic labs in NPDN. This presentation delves into the origin, development, and uses of the survey, and presents some of the outputs that have been obtained from it over the last few years.

Please check out the NPDN session on

"New Pests and Old Problems: Detection and Diagnosis of Vascular Streak Disease and Bacterial Wilt,"

organized/presented by

Drs. John Bonkowski, Fulya Baysal-Gurel, and Roger Magarey

Session supported by CIPM funded by USDA NIFA

For the latest updates, please visit the link in the QR code

Center for Integrated Pest Management (CIPM)
NC State University

AWARD RECIPIENTS

2024 LIFETIME ACHIEVEMENT AWARDS

James P. Stack

Kansas State University

For nearly 20 years Jim has been dedicated to NPDN, his passion and expertise are a key piece of the network's success. He has served as director of Great Plains Diagnostic Network since 2004 and twice served as NPDN Executive Director. Jim provides a critical voice in strategic planning as well as day to day operations. As a well known expert in plant biosecurity and plant disease diagnostics he has given keynote speeches for agencies all over the world. Jim has served on multiple NPDN committees, manages the administration of PDIS, and is an outstanding ambassador for NPDN.

Martin A. Draper

Kansas State University

As a former Diagnostician and Director of Seed Health Testing Laboratory Marty was well poised to serve as a NIFA National Program Leader where he was a key leader for administration of NPDN. While at NIFA, Marty helped guide NPDN and its regions through strategic planning and implementation of professional development. Marty also provided a steady voice and key guidance through difficult times of budget cuts and financial uncertainty. He provided important guidance in documenting and reporting the impact of NPDN and elevating the network's accomplishments. All of these efforts were key to sustaining NPDN. Marty remained a strong advocate for NPDN through his time at KSU as a Department Head and Associate Dean.

Patrick J. Shiel

U.S. Department of Agriculture APHIS PPQ Science and Technology

Prior to his retirement, Pat spent over two decades serving as a liaison between NPDN and regulatory agencies. Pat always took time out of his busy schedule to be a conduit between NDPN and USDA APHIS PPQ. His communication of timely information to NPDN leaders set an example, encouraging trust and science-based response in the world of regulatory diagnostics. Relationships that Pat built made him a critical component to working through the logistics of several surge based diagnostic programs that were handled by NDPN labs. Furthermore, NPDN diagnosticians have long benefited from the many training sessions that he helped facilitate with his work behind the scenes.

Ray Hammerschmidt

Michigan State University

Ray's involvement in NPDN began when NPDN was created in 2002; he served as one of the founding members of what was known as the NPDN Operations Committee. Ray served as director of the North Central Region since its inception. He consistently worked to maximize funding to labs through his financial management of the regional center. Early in the development of the network Ray brought together University and State Department of Agriculture diagnosticians to collaborate as members in the North Central Region, creating the starting point for many meaningful networking opportunities. In his time with NPDN he served as Executive Director, on multiple NPDN committees, guided strategic decisions, and worked to raise awareness of NPDN amongst many University administrators and the U.S. Congress.

2024 OUTSTANDING SERVICE AWARDS

Alicyn Smart

University of Maine

Alicyn Smart is the Deputy Executive Director of the National Plant Diagnostic Network and director of the Plant Disease Diagnostic Lab at the University of Maine (UM-PDDL) since 2017, which serves as the northeast regional center (NEPDN). Dr. Smart graduated from the University of Florida in 2015 as a Doctor of Plant Medicine. Alicyn was instrumental in developing and implementing the 2019 NPDN Strategic Plan and is currently a Committee Champion, functioning as a liaison between NPDN leadership committees having previously served as an executive member of the Communications, Proficiency and Protocols-Validation working groups. Dr. Smart is a co-leader in advocating for increased NPDN funding through the USDA-NIFA and the Farm Bill by educating the House Agriculture Committee, representatives from both Senate and House offices in Washington, DC about our vital role in national biosecurity and agricultural economy as NPDN diagnosticians. Alicyn is responsible for documenting NPDN Impacts and Annual Laboratory Capacity Evaluations to provide guidance, future directions and celebrate accomplishments of NPDN diagnostic labs. Alicyn is dedicated, laser-focused on the needs of growers and diagnosticians and infectiously good-humored. We are thankful for Dr. Smart's role in organizing the 2024 national conference.

Allina Bennett

University of Florida

Serving as NPDN Professional Development Coordinator for less than two years, Allina Bennett took up the reigns of this national program and developed relationships with the NPDN national committees, reorganized the learning management system catalog to be more user-friendly, built a pipeline for new content, and supported the committees in moving long-planned projects into final stages. Several modules are now available for NPDN members to take to support capacity building and gain knowledge in diagnostics and accreditation. Of particular note is her energy and helpful attitude, supporting committees with a service mentality. However, more than simply fulfilling the requirements of her position, Ms. Bennett was named by several NPDN members as being available, helpful, and productive beyond their expectations. One nominator noted "Allina always makes time to talk through an issue and readily finds solutions that don't add to my workload." Another noted "…she always finds a way to get it done, and makes us all look good in the process".

Karen Snover-Clift

Cornell University

Karen Snover-Clift stepped up to take on all *Phytophthora ramorum* qPCR samples from NPDN labs under the emergency program cooperative agreement with APHIS while coordinating the APHIS-provided trainings every spring and building out the first module of the new NPDN accreditation program. All of these are on top of directing the Cornell Plant Disease Diagnostic Clinic and participating in NPDN as an active member diagnostician. Ms. Snover-Clift volunteered to be the "hot seat" lab while Dr. Byrne took on the new Phytophthora program implementation and the UF lab lost their *P. ramorum* diagnostic certification due to personnel turnover (these three labs serve as the emergency *P. ramorum* program labs for APHIS, under a cooperative agreement for emergency diagnostics). Importantly, Ms. Snover-Clift made sure to always be "on call" so UF could coordinate shipment of ELISA-positive samples from anywhere on short notice, ensuring the samples were processed in a timely fashion to support survey and trade decisions in more than a dozen states.

Stephanie Shea

University of Maine

Stephanie Shea serves as the assistant diagnostician at the University of Maine Plant Disease Diagnostic Lab (UM-PDDL) since 2021 and the NPDN accreditation program manager since 2023. Dr. Shea earned a PhD in 2021 from University of Maine in Ecology and Environmental Sciences. As the associate director of the northeast regional center (NEPDN), Stephanie coordinates monthly meetings, determines priorities and is tasked with tracking the activities of 13 diagnostic labs across 12 states. In 2023, Stephanie emerged as a leader in developing workshops, providing guidance and implementing the Core Accreditation Program for 70 NPDN diagnostic labs. Stephanie trains laboratory staff and diagnoses diseases for Maine growers, researchers and homeowners while educating fellow colleagues with written contributions to the monthly NPDN Communicator or serving on the Professional Development Committee. Dr. Shea is energetic, consistently helpful and unflappable in the face of challenges. We are thankful for Stephanie's role in organizing the 2024 national conference.

Jan Byrne and Laura Miles

Michigan State University

Dr. Byrne and Ms. Miles are recognized for their efforts to quietly step into leadership roles in NPDN and regulatory diagnostics. These two diagnosticians at the Michigan State University Plant & Pest Diagnostics lab and NCPDN regional center volunteered to take on sole responsibility for a new Phytophthora diagnostics program for APHIS. This new program required creative thinking and implementation of DNA extraction and qPCR protocols that had been validated for research but not implemented for large-scale diagnostic workflow. Their willingness to implement these protocols and take a large number of samples at short notice ensured that once again, NPDN could say "yes" to our regulatory partners to support plant biosecurity in the US. Their screening efforts shielded the USDA-APHIS PPCDL from an overwhelming number of samples during a multi-front surge season while providing feedback to improve the protocols for capacity-building implementation in additional labs in the future.

2024 NPDN ROTTEN TUBER AWARD WINNERS

First place

Buggy ID

Zach Schumm, Iowa State University Plant and Insect Diagnostic Clinic

Second place

Mystery Yellow Antennae

Jill Pollok, University of Delaware Plant Diagnostic Clinic

Third place

The Homicide Case

Jill Pollok, University of Delaware Plant Diagnostic Clinic

RETIREMENTS

We thank all of those who have retired for their dedication to NPDN through their career.

NPDN Members

Elizabeth Bush | University of Vriginia | SPDN

Martin Draper | Kansas State University | GPDN

Heather Faubert | University of Rhode Island | NEPDN

Ray Hammerschmidt | Michigan State University | NCPDN

Sheila McBride | Texas A&M University | SPDN

Meg McGrath | Cornell University | NEPDN

Aubrey Moore | University of Guam | WPDN

Melodie Putnam | Oregon State University | WPDN

Karen Rane | University of Maryland | NEPDN

Sherrie Smith | University of Arkansas | SPDN

Alan Windham | University of Tennessee | SPDN

Meg Williamson | Clemson University | NEPDN

USDA Partners

Patrick Shiel | U.S. Department of Agriculture APHIS PPQ Science and Technology

Betsy Randall-Schadel | U.S. Department of Agriculture APHIS PPQ

DISEASES AND INSECTS

101 | A DIAGNOSTIC GUIDE TO *PHYTOPYTHIUM HELICOIDES* AND *PHYTOPYTHIUM VEXANS* CAUSING ROOT AND CROWN ROT DISEASES

Bhawana Ghimire (1); and Fulya Baysal-Gurel (2)

(1) Bartlett Tree Experts Research Laboratories, Charlotte, NC (2) Department of Agricultural Sciences and Engineering, Otis L. Floyd Nursery Research Center, McMinnville, TN

Phytopythium vexans and *Phytopythium helicoides* are important waterborne plant pathogens causing root and crown rot disease in plants from different families (*P. vexans* = 20 and *P. helicoides* = 18) worldwide. These pathogens have been reported to be infecting crops in Africa, Asia, Europe, North America, Oceania, and South America. Mainly root and crown regions of numerous perennial woody plants, herbaceous and weedy annual cereal crops, forest plants, ornamental plants, and fruit trees are reported to be infected. Certain names for the symptoms of pathogen infections associated with the host have been used, such as replant disease, decline, and sadness syndromes. Young plants that are vegetatively propagated if infected die off in severe cases, whereas in the case of older plants, the roots and crown regions are mainly affected by these pathogens. The pathogen moves within water and hence has the potential to induce chains of disease outbreaks in nurseries and greenhouses. The main objective of this diagnostic guide is to provide detailed information about symptoms and signs of root and crown rot disease, host range, geographic distribution, pathogen isolation, conventional and molecular identification, storage, and pathogenicity testing, and present a reliable zoospore production procedure for these pathogens. This guide is aimed at facilitating the detection and identification of these pathogens in the field and laboratory, and the zoospore production procedure is anticipated to help in further investigations and the development of different management strategies.

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102 | THE EMERGING VIRUSES IN CUCURBITS WORKING GROUP: EXPANDING STAKEHOLDER KNOWLEDGE AND AWARENESS OF CUCURBIT VIRUSES IN THE UNITED STATES

Rebecca A. Melanson (1); William M. Wintermantel (2); Kassie Conner (3); Jan Byrne (4)

(1) Mississippi State University, Raymond, MS; (2) USDA-ARS, Salinas, CA; (3) Auburn University; (4) Michigan State University

Numerous viruses impact cucurbit production in the United States (U.S.) by reducing marketable yields and producer profits. Many of these viruses have been present for decades and are endemic in various regions of the U.S.; others have been recently introduced and rapidly spread throughout U.S. production areas. Since 1998, 10 new viruses have been introduced or identified in the U.S. Symptom similarity as well as the abundance of mixed infections creates challenges for virus disease identification and management; knowledge on the epidemiology of many cucurbit viruses remains limited; and appropriate diagnostic methods may not be available or universally practiced for every virus. The mission of the Emerging Viruses in Cucurbits Working Group (EVCWG) is to improve communication and knowledge about viruses across the cucurbit industry and develop strategies to successfully identify and mitigate virus threats to cucurbit production in the U.S. To achieve this mission, the EVCWG holds quarterly working group meetings, identifies priorities for virus mitigation, delivers presentations to stakeholders, and develops educational resources on cucurbit viruses. The EVCWG also hosts open meeting sessions and webinars/discussions to increase opportunities for stakeholder participation and education. Stakeholders are encouraged to participate in these events and regularly visit the EVCWG website, www.eCucurbitviruses.org, for cucurbit virus information. Improved communication and increased stakeholder knowledge of virus threats and their management is necessary to reduce the rate of virus spread and successfully mitigate virus impacts for sustainable cucurbit production in the U.S.

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103 | DIFFERENTIATION BETWEEN PLASMOPARA VITICOLA CLADES VINIFERA, AESTIVALIS, AND RIPARIA USING MULTIPLEXED MITOCHONDRIAL-BASED QPCR AND DPCR ASSAYS

Lexi Heger (1); Nancy Sharma (1); Frank Martin (2); Laura Miles (1); Austin G. McCoy (1); Martin I. Chilvers (1); Timothy D. Miles (1)

(1) Michigan State University, East Lansing, MI; (2) Crop Improvement and Protection Research Unit, USDA-ARS, Salinas, CA

In vineyards, downy mildew of grapes, caused by *Plasmopara viticola*, can cause significant economic losses when left unmanaged. *Plasmopara viticola* is a species complex, made up of four clades, or cryptic species, causing disease on eight plant species within the family Vitaceae. In the United States clades aestivalis, riparia, and vinifera, have been identified, with high prevalence of all three in Michigan and the surrounding Great Lakes region. Within this study, a TaqMan qPCR assay system capable of differentiating between the *P. viticola* clades vinifera, aestivalis, and riparia was developed using a mitochondrial gene order unique to *Plasmopara* species (cox1-atp1). The multiplexed assay was validated using a panel of target and nontarget samples of varying types, including leaves, ToughSpot stickers, and air sampling rods. The assay was also transferred to and optimized on a digital PCR (dPCR) platform. Air sampling rods and artificially inoculated mixed samples were tested using both qPCR and the dPCR assays to gauge utility of each. The multiplexed assays for each clade showed varying sensitivity of 10 to 1000 fg of DNA and efficiency of 70-85%. The results suggest that using dPCR can serve as a more sensitive option than qPCR when trying to diagnose plant pathogens. This assay system provides detection of the pathogen and classification of *P. viticola* clades allowing unambiguous identification in areas growing multiple cultivated or wild grape species, which will continue to be relevant as knowledge surrounding the cryptic species develops.

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104 | *ERYSIPHE VIGNAE* AND *ERYSIPHE DIFFUSSA*: CAUSAL AGENTS OF POWDERY MILDEW IN TEPARY BEAN (*PHASEOLUS ACUTIFOLIUS* A. GRAY) IN PUERTO RICO

Consuelo Estévez de Jensen (1); Melanie E. Lugo (1); Ihann E. Rosado (1); Timothy G. Porch (2); C. Robin Buell (3)

(1) Department of Agro-Environmental Sciences, University of Puerto Rico- Mayagüez, PR. (2) USDA-ARS Tropical Agricultural Research Station, Mayagüez, PR. (3) Department of Crop & Soil Sciences, Center for Applied Genetics Technologies, University of Georgia, Athens, GA

Powdery mildew affects grain legumes in Puerto Rico, during the months of December to May when moderate temperatures are between 70 0F to 85 0F and high humidity is prevalent. In tepary beans the disease is characterized by spots and blotches of white superficial mycelia on the lower leaves, which later covers the whole plant, resulting in leaf discoloration and defoliation. Powdery mildew isolates were collected from tepary beans in Juana Diaz and Mayagüez (under screenhouse conditions) and field grown plants in Isabela. *Erysiphe vignae* was identified in four isolates (UPR-24-00495) by sequencing (GenBank accessions: PP911081 and PP911083) and morphological characteristics. Microscopic observations showed that appressoria on the hyphae were lobed. Conidiophores were cylindrical and erect. Conidia were elliptical to ovate and 27.9-40.9 x 10.5-16.9 µm in size. Using the internal transcriber spacer (ITS) of the ribosomal DNA (rDNA) and Blastn searches of GenBank, Isolate UPR-24-00495 showed 100% identity to ITS sequences of GenBank MW579545 and MG171170. Tepary beans were infected also by *Erysiphe difussa* (GenBank accession PP938951). Isolates UPR-24-00020 and UPR-24-00371 had 99.5% identity with Genbank sequence KY515231. Conidiophores were straight and curved and conidia were oval to ellipsoidal 25.7-34.4 x 12.9-18.0 µm in size. The reaction of 22 accessions and three common bean (*Phaseolus vulgaris* L.) cultivars infected by spraying conidia (106) obtained from heavily infected leaves was assessed. Tepary beans accessions had severe powdery mildew infection, with infection ranging from 3 to 9 (scale 1-9) in the different accessions. Common bean varieties 'Bella' and 'Beniquez' and PR-443-151 were not affected by *Erysiphe vignae* or *E. diffussa* and did not show symptoms or signs of powdery mildew. These findings may have implications for breeding for resistance to powdery mildew in tepary beans.

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105 | SURVEY OF ORGANIC GRAINS FOR INTERNAL AND EXTERNAL SEEDBORNE DISEASES FROM 2020-2024

Ann L. Hazelrigg; Giovanna Sassi

University of Vermont, Burlington, VT

External and internal seedborne diseases in grains can negatively impact stand establishment, crop vigor and yield. Conventional growers use fungicide seed treatments to manage seedborne diseases, but organic grain growers do not have access to these effective tools. Many organic growers save their seed, potentially increasing the incidence of these diseases over time. Using International Seed Testing Association (ISTA) protocols, we assessed 106 seed samples from 2020-2024 for the incidence of the following internally and externally seedborne diseases: *Bipolaris sorokiniana, Fusarium graminearum, Pyrenophora tritici-repentis, Microdochium nivale, Stagonospora nodorum, Ustilago tritici* and *U. nuda* in grains from 15 growers and seed companies from the midwestern and northeastern USA growing regions under organic production. Average incidence of the pathogens included: *Bipolaris sorokiniana* (6.5% incidence); *Microdochium nivale* (2.6%); *Ustilago tritici/U. nuda* (2.9%); *Pyrenophora tritici-repentis* (2.2%) and *Fusarium graminearum* (2.7%) and *Stagonospora nodorum* (0.8%). There were variations in pathogen incidence depending on the year and the state. Preliminary assays testing the efficacy of organic-approved steam and ozone treatments for reducing the incidence of seedborne diseases in organic grains has shown promising results for the reduction of Bi*polaris, Fusarium, Pyrenophora, Ustilago s*pp. and secondary molds with little effect on germination of 5 wheat varieties tested.

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106 | ANTHRACNOSE ON ORNAMENTAL ONION CAUSED BY A COLLETOTRICHUM SPECIES NEW TO SOUTH CAROLINA, USA

Jordan Withycombe (1); Tabitha Williams (1,2); Amanda Minner (1,3); G. Curt Colburn (1); Xiao Yang (1)

(1) Plant and Pest Diagnostic Clinic, Clemson University, Pendleton, SC (2) Department of Plant and Environmental Sciences, Clemson University, Clemson, SC (3) Department of Genetics and Biochemistry, Clemson University, Clemson, SC

Ornamental onion, Allium 'Millenium', is commonly planted in landscapes and gardens for its globe-like purple blooms and hardy growth (USDA Plant hardiness zones 4 to 8). In April 2024, plants with widespread foliar symptoms (almost 100% incidence) from a commercial plant nursery in South Carolina, USA were submitted to the Plant and Pest Diagnostic Clinic at Clemson University. The symptoms included leaf tip necrosis, spreading downwards causing the leaves to wilt and wither, drastically reducing the plants' marketability. Acervuli with black setae, typical of Colletotrichum species, were observed on necrotic lesions. Two representative isolates were identified as a Colletotrichum species new to South Carolina and the United States using both morphological characterization and DNA sequencing. Pathogenicity of the species causing foliar symptoms on ornamental onions was confirmed in two repeated trials. The potential of this pathogen causing post-harvest rot on onion bulbs (*A. cepa*) was investigated. Unlike *C. circinans*, this new pathogen did not cause post-harvest smudge on onion bulbs of various varieties, indicating that it may not pose a threat to the field production and storage of *A. cepa*. Whether it can cause foliar diseases on *A. cepa* warrants further investigation.

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107 | A SURVEY OF VIRUSES OF MISSOURI ELDERBERRY

Peng Tian; Lili Zhang; James E. Schoelz; Patrick Byers; Andrew Thomas

Division of Plant Science and Technology, University of Missouri, Columbia, MO

The American elderberry industry in the U.S. continues to experience rapid growth, with Missouri leading this nation-wide interest. Within the last 15 years, elderberry has transitioned from a wild fruit used occasionally for homemade jellies and wines, to a significant specialty crop used primarily in a variety of high-end dietary supplements. Elderberry is a native species and relatively easy to grow; however, we are finding increased pest and disease pressure as concentrated plantings are established, including viral diseases. Information on viruses that infect elderberry is lacking. We collected 350 elderberry samples from different regions of Missouri and screened for 10 distinct viruses using RT-PCR. Of the 350 samples, 188 and 247 samples tested positive for elderberry virus

C (EVC) and D (EVD), respectively. No EVA, EVB and EVE were detected among all samples. Blueberry scorch virus (BSV), Tomato ringspot virus (ToRSV) and Tobacco ringspot virus (TRSV) were confirmed in 4, 16, and 31 samples, respectively. Arabis mosaic virus (ArMV) and Tomato bushy stunt virus (TBSV) were not detected. High-throughput sequencing (HTS) using total RNA extracted from eight major elderberry cultivars that are grown in Missouri is ongoing and will provide a comprehensive catalog of potential viruses and novel viruses of elderberry. This project will allow us to develop a better understanding of virus situations of Missouri Elderberry, and further assist nursery leaders in generating virus-free cuttings for the market.

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108 | BBIG; A TEAM BATTLING BOXWOOD BLIGHT TO ENSURE THIS ICONIC WOODY ORNAMENTAL LIVES ON

Karen L. Snover-Clift (1); Margery Daughtrey (2); Doug Luster (3); Chuan Hong (4); Charlie Hall (5); Jerry E. Weiland (6); Fulya Baysal-Gurel (7); Fred Gouker (8); Ping Kong (4); Jo Anne Crouch (9); James A. LaMondia (10); Jay W. Scheidt (11); Luisa Santamaria (12); Nina Shishkoff (3); Mana Ohkura; (4 & 11) and Xiao Yang (3 & 13)

(1) Cornell University, Ithaca, NY; (2) Cornell University, Riverhead, NY; (3) USDA-ARS, Fort Detrick, MD; (4) Virginia Tech University, Blacksburg, VA; (5) Texas A&M University, College Station, TX; (6) USDA-ARS, Corvallis, OR; (7) Tennessee State University, McMinnville, TN; (8) USDA GGRU, Geneva, NY; (9) USDA-ARS-MNGDB, Beltsville MD; (10) Connecticut Agricultural Experiment Station, Windsor, CT; (11) Oregon State University, Corvallis, OR; (12) Oregon State University, Aurora, OR; (13) Clemson University, Pendleton, SC.

The arrival of boxwood blight, quickly followed by box tree moth, changed the use of boxwood for many landscapers, growers, and homeowners. The Boxwood Blight Insight Group is a team of multi-state and transdisciplinary researchers and extension educators brought together to provide all those battling the dreaded boxwood blight disease with the knowledge and tools needed to win the war against the boxwood blight fungus, *Calonectria pseudonaviculata*. The primary objective of this project is to put research into practice by addressing how to re-achieve sustainable boxwood production and gardening, ensure blighted plants are identified quickly and accurately, disseminate management recommendations to assist those at contaminated sites, develop more disease resistant or alternative plants that can provide the favorable boxwood characteristics and make activities and products economically feasible. A key component of the project is timely technology transfer to NPDN diagnosticians and others that protect plants to incorporate the best identification methods and encourage the use of better management strategies such as publishing two diagnostic guides, developing a lateral flow device, demonstrating rain distribution and not wind, and showing the benefits of mulching, plant spacing and proper fungicide application methods. Benefits for the boxwood community include US and European researchers collaborating, an International Seminar Series and programs ensuring trainings were available in English and Spanish. The BBIG team was the recipient of the 2022 USDA NIFA Partnership Award for program innovation through global engagement.

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109 | THE EMERGING DISEASE OF BLUEBERRY LEAF RUST IS CAUSED BY *THEKOPSORA MINIMA* IN NEW HAMPSHIRE

Bo Liu; Aaron Hogg; Serena Britos; Tyler Edwards

University of New Hampshire, Durham, NH

In the summer and fall of 2023, leaf rust was observed on highbush blueberry *(Vaccinium corymbosum L.)* throughout the farms in Merrimack, Hillsborough, and Strafford Counties in NH. Symptoms were found mainly on older leaves, and premature defoliation were observed with the varieties of Rubel, Jersey, Elliott, Liberty, and Brigitta. Purplish-brown necrotic spots were present on the adaxial leaf surface, while the abaxial leaf side exhibited orange to yellow colored uredinia. Urediniospores were broadly obovate with dark yellowish content and measured 19 to 25 × 16 to 20 µm (average 22 × 18 µm, n = 30). The spore walls were hyaline, echinulate, and 1.0 to 1.5 µm thick with obscure germ pores. Potential alternate hosts (*Tsuga* spp.) for blueberry leaf rust were present around the orchards. Leaf samples with rust symptoms were collected and stored at 4°C for molecular confirmation using ITS primers (ITS1 and ITS4). The sequences of around 500 bp fragments of ITS regions match the ITS sequences of blueberry leaf rust pathogens deposited in GenBank with 99% similarity, indicating the leaf rust pathogen is the emerging disease in NH. To our knowledge, this is the first report of *T. minima* on blueberries

within NH, which could be related to significant summer and fall precipitation.

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110 | A SURVEY OF TOMATO BROWN RUGOSE FRUIT VIRUS IN SYMPTOMATIC TOMATO AND PEPPER PLANTS IN MAINE GREENHOUSES

Sydni M. Plummer; Stephanie A. Shea; Alicyn Smart

University of Maine, Orono, Maine

Tomato brown rugose fruit virus (ToBRFV) is a virus that affects tomatoes and peppers. ToBRFV is a positive sense, single-stranded RNA virus in the Tobamovirus genus, along with Tobacco mosaic virus, Tomato mosaic virus, and Pepper mild mottle virus. ToBRFV can infect varieties of tomatoes and peppers that have resistance genes to other Tobamoviruses, and there are currently no ToBRFV resistant varieties available. ToBRFV is spread through contaminated seed and mechanical transmission, and new laboratory research suggests that insects may be a vector of ToBRFV. ToBRFV was first discovered in 2016 in Jordan, and was later traced back to an outbreak in Israel in 2014. Since then, it has been detected in at least 35 countries, including the United States. Our survey investigates the distribution and prevalence of ToBRFV in Maine greenhouses, potentially supplemented with samples from other New England states, through testing symptomatic plants for the virus using plant RNA extraction followed by reverse-transcription qPCR. This research will give us a better understanding of the symptoms associated with tomato and pepper infection, the geographic distribution of infected and symptomatic tomato and pepper plants, and the viral load found in each host in Maine, which may contribute to further exploration of viral spread and control.

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111 | DIAGNOSING MUNGBEAN: REVEALING DISEASES ASSOCIATED WITH AN EMERGING CROP IN THE UNITED STATES

Evelyn Heidt (1); Jean C. Batzer (1); Arti Singh (2); Daren S. Mueller (1)

(1) Iowa State University Department of Plant Pathology, Entomology and Microbiology (2) Iowa State University Department of Agronomy

The expansion of mungbean (*Vigna radiata*) cultivation in the U.S. is driven by its popularity in the consumer sector, adaptability to various climates, and compatibility with existing soybean-production infrastructure. Mungbean's short growing season (60-90days) makes it suitable for various cropping systems as a row or cover crop. However, concerns arise regarding potential overlap with common soybean diseases because of its similarity to soybean as a legume. To generate information for farmers interested in mungbean cultivation, we surveyed the disease portfolio and biotic pressures on two commercial mungbean varieties (Berken and OK2000) and sentinel plots of 12 mungbean and urdbean accessions in Story County, Iowa, during the summers of 2022 and 2023. We reported three new diseases on *Vigna* spp and five diseases that have severe impacts on mungbean vigor and seed quality. Koch's postulates were conducted to confirm the pathogenicity of the recovered isolates and then were sequenced to provide molecular characterization. A library of mungbean pathogens is being created to combat severe mungbean diseases and provide plant breeders with information to create resistant varieties. Wide scale implications of these diseases for mungbean cultivation are uncertain, but disease discovery and quantification are essential to developing mungbean's presence in North American cropping systems.

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112 | FIRST REPORT OF MOUNTAIN LAUREL SCARLET MIRID (LOPIDEA MAJOR KNIGHT) IN ARIZONA

Dustin C. Sandberg; Dr. Jason T. Botz

USDA-APHIS Plant Protection and Quarantine, Nogales, Arizona

In Arizona, the small fabaceous tree, Texas mountain laurel (*Dermatophyllum secundiflorum* [Ortega] Gandhi & Reveal), serves as a popular ornamental and landscaping plant. Due to its fragrant and showy flowers, *D. secundiflorum* has been brought outside of its native range of New Mexico and Texas to be sold by retailers and planted by consumers and landscapers. In Pima County, Arizona, several of these trees were found to have populations of red and black mirid on them. The mirid was identified as the non-native mountain laurel scarlet mirid *Lopidea major* Knight (Miridae). This species is known to occur in Texas and Mexico and is categorized by the USDA as a Non-Quarantine pest for the continental United States, but is categorized as Quarantine Significant for Hawaii and Puerto Rico. Although the mirid is of limited concern to native ecosystems, it is known to feed on flowers and young leaves of *D. secundiflorum* which can cause deformation and chlorosis. Here we present a first report for populations of *L. major* found throughout Pima County.

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113 | BIONOMICS OF CRAPE MYRTLE BARK SCALE (ACANTHOCOCCUS LAGERSTROEMIAE) CRAWLERS

Cora N. Yates (1); Kassie N. Conner (1); David W. Held (2); Arthur G. Appel (2); Austin K. Hagan (2)

(1) Alabama Cooperative Extension System, Auburn University, Alabama, USA (2) Department Entomology and Plant Pathology, Auburn University, Alabama, USA

Crape myrtle bark scale (CMBS, *Acanthococcus lagerstroemiae*) is an invasive pest of crape myrtles (CM, Lagerstroemia) used in ornamental landscapes throughout the United States. Infestations of CMBS affect the aesthetic value of CMs and when the population is high enough, CMBS infestations can kill young CM trees. This also affects the CM industry due to increases management costs. Being first reported in the US just 20 years ago, there are still gaps in the knowledge of bionomics of CMBS. Observing these gaps, these experiments noted various traits and reactions of these scale insects both on and off host to better understand CMBS phenology. Over a two-year period, crawler movement in areas of known infestations were observed in locations in north and south Alabama. To observe survivability off host, infested CM twigs were placed in incubators. Newly hatched CMBS crawlers were placed in desiccators at varying humidity levels and temperatures. To simulate phytosanitary disposal of CMBS, groups of crawlers were held at 30 deg C for periods of 1,7, and 14 days. The results of these ongoing experiments will be presented.

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114 | ALLIANCE OF PEST CONTROL DISTRICTS EXPANDING SERVICE TO MULTIPLE CITRUS PESTS

Dhiraj Gautam; Saurabh Gautam; Subhas Hajeri

Alliance of Pest Control Districts, Tulare, California

With increased international travel, pests and diseases are constantly moving in new areas; thus, their early detection is critical for timely management. California's Citrus Pest District Control Act of 1939 A.D. allowed citrus growers to organize, operate, and govern pest control districts (PCDs) to effectively control and eradicate citrus pests of concern to the participating growers. San Joaquin Valley has five pest control districts, where ~70% of California citrus is produced. These PCDs formed a joints power agency, Alliance of Pest Control Districts (APCD), initially to manage Citrus Red Scale and then Citrus Tristeza Virus and now multiple citrus pests and diseases, including Asian citrus psyllid (ACP), Huanglongbing (HLB), Citrus Yellow Vein Clearing Virus, and exotic fruit flies. With 16 permanent and 11 seasonal staff, APCD conducts three major activities: mapping the citrus acreage, field operations, and lab operations. Mapping operations include generating digital maps of the citrus groves in ArcGIS and maintaining grower information. The trappers and inspectors are provided with 1-square mile Section maps and corresponding citrus information for their routine field operations. Trapping and field inspection sites are selected based on high-risk criteria such as previous ACP find sites, organic citrus, proximity to citrus packing house, residential citrus, and transportation corridors. For spring 2024, 3,102 sites were selected for trapping, and 12,397 traps were serviced. All the traps have been screened for ACP, brown citrus aphids, and Glassy-winged sharpshooters. Lab has CDFA's non-regulatory permit to test plant and insect samples for HLB.

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DIAGNOSTIC PROTOCOLS/TECHNIQUES

201 | DEVELOPMENT AND APPLICATIONS OF A TAQMAN QUANTITATIVE PCR ASSAY FOR DIAPORTHE HUMULICOLA, THE CAUSAL AGENT OF HALO BLIGHT OF HOP

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Halo blight of hop, caused by *Diaporthe humulicola*, was first described in 2018 and is a major concern for hop growers in the eastern United States and Canada. This pathogen can cause major yield loss by desiccating hop cones, leading to shatter. However, traditional disease diagnosis is time-consuming, with culture-based features taking up to 30 days to develop, thus reducing the amount of time growers have to make management decisions.

To address this issue, a quantitative polymerase chain reaction (qPCR) assay based on the translation elongation factor 1-alpha gene was developed. We assessed this assay for direct detection of *D. humulicola* in plant samples and investigated its biology through three distinct experiments: 1) detection of *D. humulicola* in hop rhizomes to determine the colonization range of the pathogen, 2) determining how quickly can *D. humulicola* be detected in hop leaves post-inoculation, and 3) monitoring the presence of *D. humulicola* in cones in a hop yard and comparing isolation methods and the assay. The limit of detection for the assay was 100 fg of DNA. The assay showed no cross-reactivity with other hop pathogens or endophytes, nor with other *Diaporthe* species. Detection of *D. humulicola* occurred one day after inoculation. The assay detected *D. humulicola* in both healthy and diseased rhizome tissue, but further investigation is required to determine the cause of the observed symptoms. The assay successfully detected the pathogen in individual hop cones and burrs throughout the season, surpassing the culture-based method in positive identification rates. This assay will provide time-limited diagnosticians a tool to rapidly detect *D. humulicola*.

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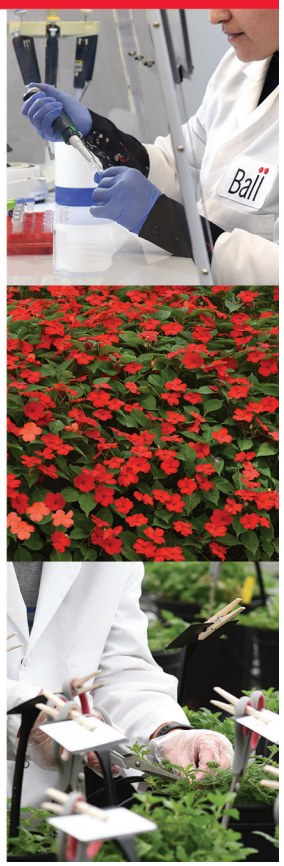

202 | HOW MANY CONIDIA DO WE NEED? BOXWOOD BLIGHT CULTURING METHODS AND SPORULATION ASSESSMENT

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Boxwood blight caused by *Calonectria pseudonaviculata* (Cps) in North America continues to be an important fungal pathogen of boxwood (*Buxus* sp. and cultivars). Studying boxwood blight for purposes such as resistance, epidemiology, and management often requires culturing of fungal isolates for spore production and artificial inoculation. The purpose of this study was to assess existing and new methods of growing Cps, with the expectation that methods vary greatly in time and equipment demands, as well as spore production consistency. We also explored the difference in spore production and virulence between a Cps isolate recovered in 2018 being frequently and routinely subcultured with fresh isolates recovered in 2023 and 2024. We compared four culturing methods: GYET media with cellophane; water agar with autoclaved English boxwood (*B. sempervirens* 'Suffruticosa') leaf pieces; water agar with autoclaved English boxwood leaf powder; and ½ strength PDA, grown and then scraped and placed under near UV light. All cultures were used to inoculate fresh 'Suffruticosa' boxwood leaves to confirm virulence and reinfection. We found high variation in sporulation across both culturing methods and isolates. The GYET method typically produced the most spores but required the most time. The PDA method, while producing fewer spores, required much less time and materials. Ultimately, the choice of culturing method should be determined by the amount of spore solution required for desired inoculation and the time available. Through these experiments we have found a simpler method that results in rapid spore production.

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203 | RAPID DETECTION OF *PHYTOPHTHORA INFESTANS* USING REAL-TIME LOOP-MEDIATED ISOTHERMAL AMPLIFICATION (LAMP)

Katie L. Malek; A. L. Malek, S. Dangi; J. W. Woodhall; P. S. Wharton

University of Idaho

Late blight of potato, caused by *Phytophthora infestans*, is a major constraint to potato production worldwide. Early detection, coupled with a knowledge of the genotype present, can ensure the timely implementation of the most optimal disease management strategies. Recently, loop-mediated isothermal amplification (LAMP) assays have become more widely used for the rapid on-site detection of *P. infestans*, but these assays have limitations. In this study, we developed a new LAMP assay using the ypt1 gene for P. infestans which can readily distinguish P. infestans from other oomycetes such as *P. erythroseptica, P. mirabilis, P. nicotianae*, and *Pythium ultimum* within 10 minutes on a Genie II or IIIC platform. In addition, six other published LAMP assays were compared with our assay on Genie IIIC using the same concentration of primers. Our assay was more reliable than other assays based on specificity and sensitivity on the Genie platform. Our LAMP assay based on the ypt1 gene did not cross-react with *P. mirabilis* or *P. phaseoli*. However, although our assay did cross-react with *P. andina* and *P. ipomoeae, P. ipomoeae* was easy to distinguish because it amplified very late in the reaction. The lower limit of detection (LOD) of our LAMP assay was determined to be 1 pg/µL (LAMP run for 25 min) for pure culture. LAMP and quick DNA extraction technology, coupled with a portable platform such as the Genie IIIC, enable the rapid on-site detection of *P. infestans*. Samples confirmed as *P. infestans* can be sent to the lab for further genotyping and molecular characterization.

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204 | OPTIMIZING METHODS FOR PATHOGEN DETECTION IN VARIABLE WOODY TISSUES USING HIGH-THROUGHPUT EXTRACTION AND REAL-TIME PCR

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Plant diagnostic labs seeking to expand their molecular testing services often face cycles of resource limitation and lack of appropriately developed tools. Both must be addressed to meet the growing need for large-scale molecular testing. Our priorities for improvement include optimizing methods to extract high-quality, amplifiable pathogen nucleic acid, and to do so from a wide variety of challenging host tissue types. . Specifically, processing woody plant tissue presents practical challenges of effectively homogenizing samples, easily extracting the DNA, and producing amplifiable pathogen DNA for detection downstream. Here, we provide an example of a multi-faceted development process to address these challenges, using detection of *Xylella fastidiosa* in a wide variety of oak (*Quercus* spp.) hosts as a model. By simultaneously developing robust processes for nucleic acid extraction as well as downstream.

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205 | DEPLOYING ADVANCED DIAGNOSTIC TOOLS TO SUPPORT THE IDAHO POTATO INDUSTRY

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Idaho is the leading producer of potatoes in the US. As potatoes are vegetatively propagated, the presence of diseases can be particularly problematic. NPDN diagnostic labs situated in Parma and Idaho Falls play vital roles in supporting this important industry by providing extensive testing, regional crop monitoring, and free services to the potato industry to identify and characterize new and unusual diseases. Recently, the labs documented the first occurrence of rubbery rot in the US, identified symptoms and presence of sclerotia of *Sclerotinia sclerotium* occurring within tubers, and recorded multiple new records of anastomosis groups of *Rhizoctonia solani* in potatoes. The Parma Plant Diagnostic Services lab offers direct tuber and soil testing of multiple potato pathogens using qPCR. To facilitate these molecular tests, total nucleic acid extraction methods were developed for bulked 300

g of soil or 100 potato cores. Proactive diagnostic services, performed before symptoms appear, include spore trapping for *Phytophthora infestans* and aphid monitoring for Potato virus Y. Weekly updates on aphid and spore levels are emailed to subscribers during the growing season. Interactive reports from current and past seasons are available on the Idaho Pest Monitoring website (https://idahopestmonitoring.org/). These diagnostic efforts, whether reactive (symptom-based) or proactive (monitoring-based), provide the Idaho potato industry with essential tools to make timely, integrated disease management decisions.

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206 | DIAGNOSTIC CONFIRMATION AND COMMUNICATION PROTOCOL

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The NPDN Diagnostic Confirmation and Communication Protocol was created by the Regulatory Relations Committee to help NPDN members, diagnosticians, and laboratory personnel navigate the complex landscape of plant pathogen regulation and official confirmation. This protocol is maintained by the NPDN Regulatory Relations Committee, whose membership is made up of individuals from land grant universities, National Plant Board, local regulatory authorities, United States Forest Service, and United States Department of Agriculture Animal and Plant Health Inspection Service. Here we provide guidance for diagnosticians who suspect they have found a new, regulated, otherwise significant pest, or select agent. We also provide a QR code to the protocol on the NPDN's website, which in turn links to the webpages, emails, and forms needed for reporting these organism detections. Finally, we provide the current list of USDA-PPQ Select Agents and USDA Plant Pest and Disease Programs for easy reference.

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207 | A COMPARABILITY STUDY OF AUTOMATED NUCLEIC ACID EXTRACTION SYSTEMS FOR USE DURING ROUTINE DIAGNOSTIC SCREENING OF REGULATED PLANT MATERIAL FOR *PHYTOPHTHORA RAMORUM*

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Automated nucleic acid extraction systems (ANAES) are powerful tools for diagnostic labs. As laboratories adopt more molecular methods for plant pathogen identification, the need for high-quality nucleic acid extraction in high-throughput has increased. ANAES extract high-quality nucleic acids at a fraction of the time it takes to use a manual extraction kit. There are many different ANAES on the market from companies including Qiagen, ThermoFisher, and Promega. The DATCP Plant Industry Bureau Lab in Wisconsin was an early adopter of the Maxwell® 16 and later the Maxwell® RSC instruments, where they reliably proved to extract high-quality plant DNA and RNA. Recently, additional laboratories in the NCPDN adopted these instruments for use in their laboratories. In 2022, two NCPDN laboratories requested to perform a NPPLAP (now PPDCP) planned deviation using the Maxwell® RSC and Maxwell® RSC 48 instruments for nucleic acid extraction from plant tissue for *Phytophthora ramorum*. In this comparison study we assess the two instruments for their cross-contamination rates, extraction efficiency of high and low titer samples, range of error in replicates, operators, instruments, and labs; and well-to-well effects. The study includes two laboratories and three operators. The PPDCP analyzed the results and found they were comparable with results obtained using the PPDCP approved method, demonstrating the effectiveness of these instruments for plant disease diagnostic testing.

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208 | DETECTION OF OAK WILT IN PETIOLE AND WOOD TISSUES USING A QUANTITATIVE PCR ASSAY

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The fungus *Bretziella fagacearum*, the causal agent of Oak Wilt, is prevalent in midwestern states with devastating effects in landscape and forest trees. In Virginia, this pathogen has not yet been detected by laboratory testing, and only one anecdotal report exists. Oak species, sample collection (quantity and quality), and transit conditions may impact the traditional culturing method. Other molecular detection methods have proven to be non-specific or prone to contamination. Our goal was verifying a published quantitative polymerase chain reaction (qPCR) assay method implemented at the Plant and Pest Diagnostics Michigan State University. We investigated the effect of tissue type (sapwood chips, drilled wood shavings and leaf petioles) and two different DNA extraction methods (Omega Mag-Bind Plant DNA ds Kit with the automated King Fisher Duo Prime and compare with Qiagen Stool kit routinely used at MSU). We verified this qPCR assay using the Quant Studio 3 Real-Time qPCR system, compared to the Bio-Rad platform used at MSU.

The assay detected the pathogen on leaf petioles and wood tissues from symptomatic tree samples using both DNA extraction types, and currently fits the equipment and labor/time resources available at the Virginia Tech Plant Disease Clinic. Verification of this assay benefits the state of Virginia by allowing preparedness should the disease reach the Mid-Atlantic states. Our data may encourage new opportunities for the adoption of this detection method by diagnostic laboratories in more states across the US, and more importantly, simplify the sample type necessary for the test, make collection of symptomatic tissue as easy as possible for clients.

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209 | DIAGNOSTIC TOOLS FOR DETECTION OF THE ELUSIVE VASCULAR STREAK DISORDER PATHOGEN

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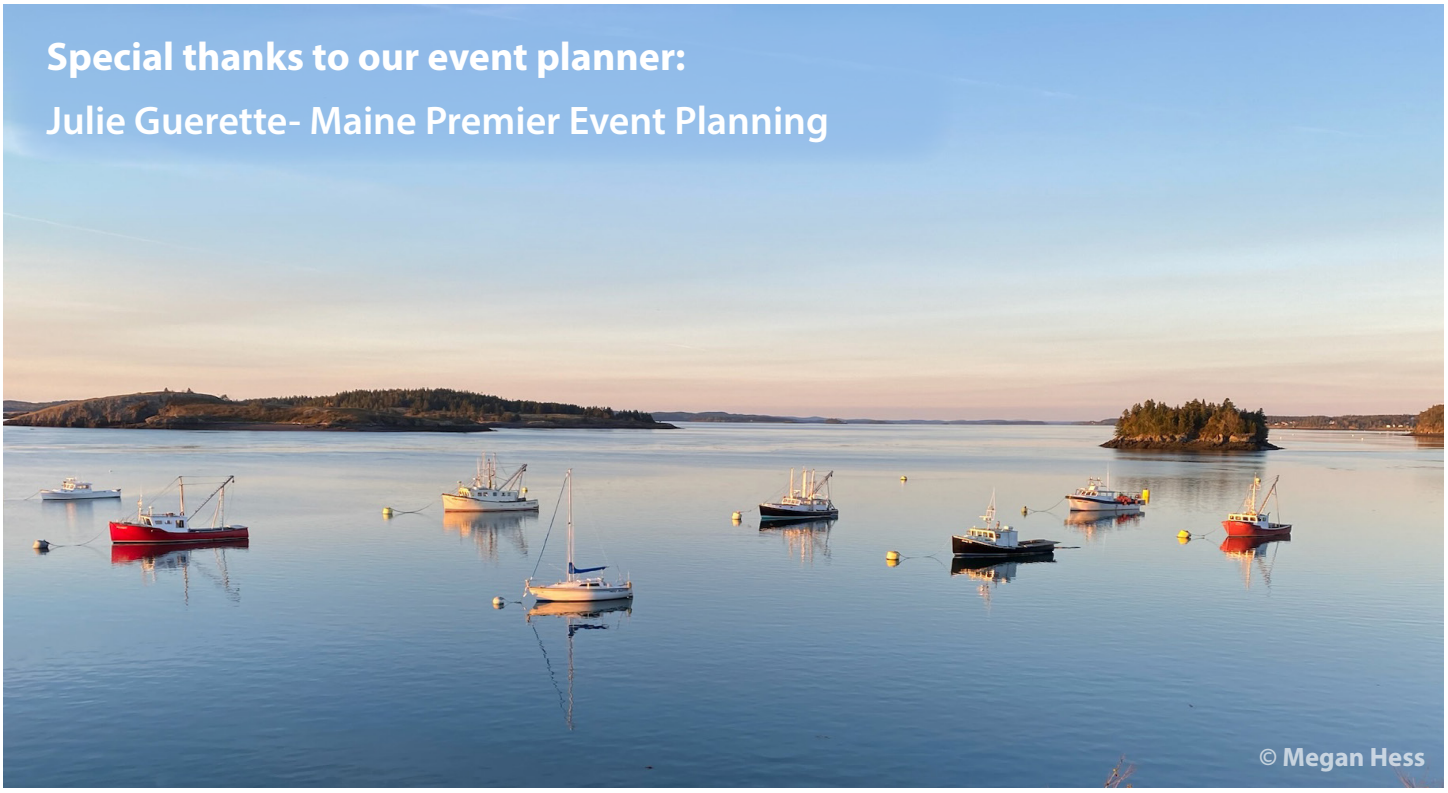

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A new fungal-plant associated disorder is currently threatening the eastern US nursery industry, with more than 25 woody landscape species from at least 14 plant families being affected. Symptoms include branch dieback, vascular tissue discoloration, and wilting. Fungi recovered from symptomatic plant tissues are very slow growing on nutrient media and exhibit "semi-obligate-like" growth characteristics in culture and render morphological identification unreliable. Data from ITS sequence analysis and hyphal morphology placed the isolated fungi in the family *Ceratobasidiaceae* and tentatively identified as *Rhizoctonia* sp. But, Koch's postulates remain to be fulfilled despite extensive and repeated attempts. To assist plant producers and vendors in ensuring the integrity of their nursery stock, we developed two molecular screening methods that target the fungi isolated from the symptomatic plant tissues and validated them using (a)symptomatic plant tissues and collection of DNA from related fungi. Microsatellites were developed from a draft assembly of Illumina data and screened for specificity using a collection of *Ceratobasidiaceae* DNA. Target DNA sequences were used to develop and evaluate the sensitivity of a TaqMan assay which resulted in a detection limit of 7 pg DNA, visualized using UV lamp and special spectrum-filtering glasses. A loop-mediated isothermal amplification (LAMP) was developed to target a ribosomal 5.8S::18S intergenic spacer region and allowed for specific and color-based detection with a detection limit of 2 pg DNA. The LAMP method offers a field-based detection option using an inexpensive portable PCR device that requires minimal training. The TaqMan coupled with the LAMP method will be useful for diagnostic purposes and examining fungi associated with Vascular Streak Disorder.

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210 | TEST PERFORMANCE STUDY VALIDATION OF A RECOMBINASE POLYMERASE AMPLIFICATION (RPA) DIAGNOSTIC ASSAY FOR PHYTOPHTHORA RAMORUM

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Phytophthora ramorum is a regulated oomycete plant pathogen now endemic to the northwest U.S. and Canada, capable of infecting multiple ornamental and forest hosts. The movement of ornamental plants infected with *P. ramorum* from quarantined nurseries in the U.S. and resultant surge in samples experienced by diagnostic laboratories certified to run the approved diagnostic protocol has emphasized the need for a rapid screening assay with improved specificity, versatility, and speed. An isothermal RPA assay was developed and optimized for detection of *P. ramorum* to improve diagnostic specificity while reducing testing turnaround time without loss of sensitivity. The developed assay demonstrated sensitive and specific detection of *P. ramorum* detecting down to 1 fg of DNA from each of the 4 lineages, avoiding cross-reaction with over 100 different oomycetes in 30 hosts. Following two tiers of formal assay validation, we designed a blind Test Performance Study (TPS) to evaluate the repeatability and robustness of the assay using a uniform panel of *P. ramorum*-infected and uninfected rhododendron leaf tissue samples. The TPS was conducted on four different commercial fluorescent cycler instruments in five independent diagnostic laboratories with ten operators with varying experience in *P. ramorum* diagnostics. The developed RPA assay provides a rapid and demonstrably robust approach for molecular detection and identification of *P. ramorum* in multiple host matrices.

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211 | DEVELOPMENT AND VALIDATION OF MULTIPLEX REAL-TIME PCR ASSAYS FOR DETECTION AND DIAGNOSIS OF THE SELECT AGENT FUNGAL PLANT PATHOGEN CONIOTHYRIUM GLYCINES, CAUSAL AGENT OF RED LEAF BLOTCH OF SOYBEAN

Kurt Zeller (1); Aida Duarte (1); Fernanda Proaño-Cuenca (2); Yazmin Rivera (1)

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Red leaf blotch of soybean (SRLB) is caused by the *Coniothyrium glycines*, a fungal plant pathogen only reported from select soybean growing regions in Africa. This pathogen causes severe yield losses where it is found, and thus has been designated as a USDA Select Agent organism. Early detection is part of the foundation for plant protection and quarantine programs. In this study, we developed and validated real time PCR tests for the detection of *C. glycines* on suspect samples of soybean. To achieve this, we identified gene target regions and mapped them to genome sequences for *C. glycines* to confirm that they are present in single copies those reference genomes. We optimized primer, probe, and reaction conditions for candidate real time PCR assays. After optimization, the assays were validated to determine standard performance characteristics that include limit of detection, linearity, repeatability, selectivity, specificity, and assay precision across different machines and operators. The limit of detection for our real time PCRs are approximately 100 fg of *C. glycines* DNA with an average Ct value of 36 at that concentration. The assays show high linearity, reaction efficiencies of approximately 100% between 10 ng and 100 fg of target DNA. The assays also did not cross react with DNA from a set of 7 other soybean fungal diseases common US soybeans and were able to detect DNA from 14 total tested isolates of *C. glycines.*

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212 | A NEW FLEXIBLE SCOPE IN PROFICIENCY TESTING: THE PPQ PPDCP INTERPRETIVE PROFICIENCY TEST

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The PPQ Plant Pathogen Diagnostics Certification Program (PPDCP) offered the first interpretive proficiency test (iPT) for huanglongbing (HLB) in 2023. The iPT approach, a digital test in which virtual assay results are interpreted by the participant, is standard in the medical and forensics fields but is underutilized elsewhere. iPTs can be quickly developed and deployed relative to lab-based PTs. They can also be tailored to reflect a program's needs as quality issues arise and can focus on overlooked diagnostic processes. PPDCP added iPTs to its panel offerings to reduce costs and improve program flexibility. The HLB 2023 iPT consisted of four sections that assessed knowledge of analyzing and interpreting HLB test results according to PPQ-approved protocols. Twelve labs participated in the HLB iPT round; twenty-four diagnosticians were certified for regulatory screening, and five were certified for confirmatory diagnostics. In 2024, PPDCP added an iPT for Phythopthora ramorum and plans an additional iPT for Plum Pox Virus. iPT-certified diagnosticians provide testing to support PPQ programs, such as the Citrus Health Response Program. Maintaining a roster of certified diagnosticians enhances United States lab capacity and supports plant health emergency preparedness.

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213 | VALIDATION OF DUPLEX REAL-TIME PCR ASSAYS AND A SYNTHETIC DNA CONTROL FOR DETECTION OF ERWINIA PYRIFOLIAE, THE CAUSAL AGENT OF ASIAN PEAR BLIGHT

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Erwinia pyrifoliae (Ep) is an exotic pathogen that causes blight symptoms on pear (*Pyrus* spp.), apple (*Malus* spp.) and strawberry (*Fragaria* × *ananassa*), which are economically important commodities in the United States (US). Disease symptoms on pear and apple are indistinguishable from those caused by the well-known and established (non-regulated) fire blight pathogen, *E. amylovora* (Ea), which also causes disease on strawberries, thus creating a need for specific diagnostic tools that can detect and differentiate Ep from Ea. Availability of validated diagnostic tools is the cornerstone of successful surveillance, quarantine, and eradication measures. In this study, assays based on two different Ep-specific targets were validated; one assay was described previously, and one was developed in this study. These were duplexed with either a 16S rDNA (bacteria) or 18S rDNA (plant) internal control to accommodate different sample types and extractions. Ep-specific targets showed similar performance, with a limit of detection of ~5 genome equivalent copies (GEC) per reaction with 100% positivity, demonstrating high sensitivity. The assays also demonstrated 100% analytical and 99% diagnostic specificity.

Positive results were obtained for nine *E. pyrifoliae* isolates, comprising Korean, Japanese and strawberry isolates (inclusivity). No cross-reactions observed with other *Erwinia* spp. tested, except closely related *E. uzenensis*, nor with 52 other pathogens and six biocontrol agents (exclusivity, N=76). These assays were deployed successfully when testing symptomatic strawberries, and are beneficial tools that support efforts to protect US agriculture and facilitate safe trade.

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214 | EARLY DETECTION OF CUCURBIT VIRUSES IN ARIZONA UTILIZING SENTINEL PLANTS AND RNA-SEQ

Dr. Johan Murcia; Martin Porchas Jr.; Dr. Bindu Poudel-Ward

University of Arizona-Yuma County Cooperative Extension

Sentinel plants describe susceptible plant species used to detect the spatial-temporal presence of plant pathogens. They could be either planted in the field to expose them to the pathogen of interest or occur naturally in ecosystems. In the fall 2023 a field experiment was conducted using five cucurbits species (varieties = 12) as sentinels for cucurbit viruses. The experiment was conducted in three different planting dates (Earlier, regular, and late planting). Total RNA was extracted from leaf tissues (~70 days after planting), and an equimolar pool sample was made for each planting date and used for cDNA library construction. The cDNA library was sequenced on the Illumina NovaSeq 100M platform generating ~40M single end reads (150nt /each). The *De-novo* assembly was made using trinity software and then contigs were submitted to nBlastX against the RefSeq virus genomes (NCBI). Species belonging to the genus Crinivirus, Potyvirus, Ilarvirus, Begomovirus and Coguvirus stand out as the main virus genus detected in the sentinel plants, some of them being detected in AZ for the first time. In this project, we highlight the significance of sentinel plants in the early detection of emerging cucurbit viruses.

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NPDN LABS

301 | HAWAII PHYTOPATHOGEN DATABASE FOR DISEASE DIAGNOSIS, CONSULTATION, AND RISK ASSESSMENTS

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Plant disease indices are essential for disease diagnosis, consultation, and risk assessments. The first description of plant diseases in Hawaii was published in 1906 by Nathan Cobb, who worked as the plant pathologist for the Hawaiian Sugar Planters Association. Since then, the phytopathogen checklist has undergone multiple iterations, but no major revisions have been made since 1981, despite the publication of many new disease records from currently available data sources. Therefore, a project was initiated to update and reformat the current checklist as a database for data mining and analyses. The current database consists of 15 new data sources increasing the records of new phytopathogens by 8-fold. All data sources were transformed for initial concatenation of phytopathogen records, plant host names, date, location information, and citation. Microbial nomenclature was assigned based on the National Center for Biotechnology Information taxonomy database and manual inputs. Pathogenic status (phytopathogen or saprophyte) was assigned based on the United States Department of Agriculture fungal-host database and National Plant Diagnostic Network pathogen list. The majority of phytopathogens reported in Hawaii are fungi (60.4%) and bacteria (35.6%). Higher numbers of reports were found in the 20s, 70s, and 2010s. Furthermore, the island of Oahu had the highest number of reports. This may reflect reporting activity rather than disease incidence. Future work includes organization of an editorial board for quality control, deployment of the database for public access, and filling gaps with statewide phytopathogen surveys.

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302 | THE PROCESS OF IMPLEMENTING A GENERAL SAMPLE FEE AT THE UNIVERSITY OF MAINE PLANT DISEASE DIAGNOSTIC LAB

Alicyn Smart; Stephanie A. Shea; Sydni Plummer; Kelsey Chase; Randi Phillips

University of Maine, Orono ME

In 2024 the University of Maine Plant Disease Diagnostic Lab initiated a fee for general physical samples. The lab previously charged for specialty testing, but not for general plant disease identification. Additionally, the lab initiated a fee for digital sample submissions. This poster outlines the revenue, the struggles, the benefits, and the surprises of implementing a fee for service in a plant disease diagnostic lab.

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303 | UNIVERSITY OF RHODE ISLAND COOPERATIVE EXTENSION- PLANT DIAGNOSTIC LABORATORY UPDATE

Keiddy Urrea-Morawicki

Kathleen M. Mallon Outreach Center, Kingston, RI

The URI Plant Diagnostic Laboratory (PDL) serves agricultural and horticultural growers, landscape professionals, and the general public in Rhode Island. The PDL identifies plant problems and provides management recommendations for diseases, insects, weeds, and abiotic problems. The laboratory's name has recently been changed to URI Plant Diagnostic Laboratory, better reflecting its purpose. As part of the changes, the Laboratory has a new website, including new submission forms, guidelines, and all information clients need to submit samples. Additionally, with support from the NEPDN, NPDN, and URI client donations, the laboratory acquired a biosafety cabinet and a small autoclave for the first time. The acquisition of this equipment allows the laboratory to increase its diagnostic capabilities, such as culturing. Also, this equipment has allowed the Laboratory to file an application for the PPQ526 APHIS permit, which will continue allowing the Laboratory to receive out-of-state samples and support the mission of the NPDN. The Laboratory has also started to prepare for the NPDN Core accreditation process; the NPDN accreditation manager visited the laboratory last May. The PDL is an active part of the URI Integrate Pest Management team, collaborates closely with the Department of environmental Management (DEM) Division of Foresty and Agriculture, conducts training and talks to Master Gardeners, Growers, Rhode Island Nursery Association members, participates in growers' twilight meetings, and works closely with URI faculty supporting their plant pathology and plant diagnostics needs.

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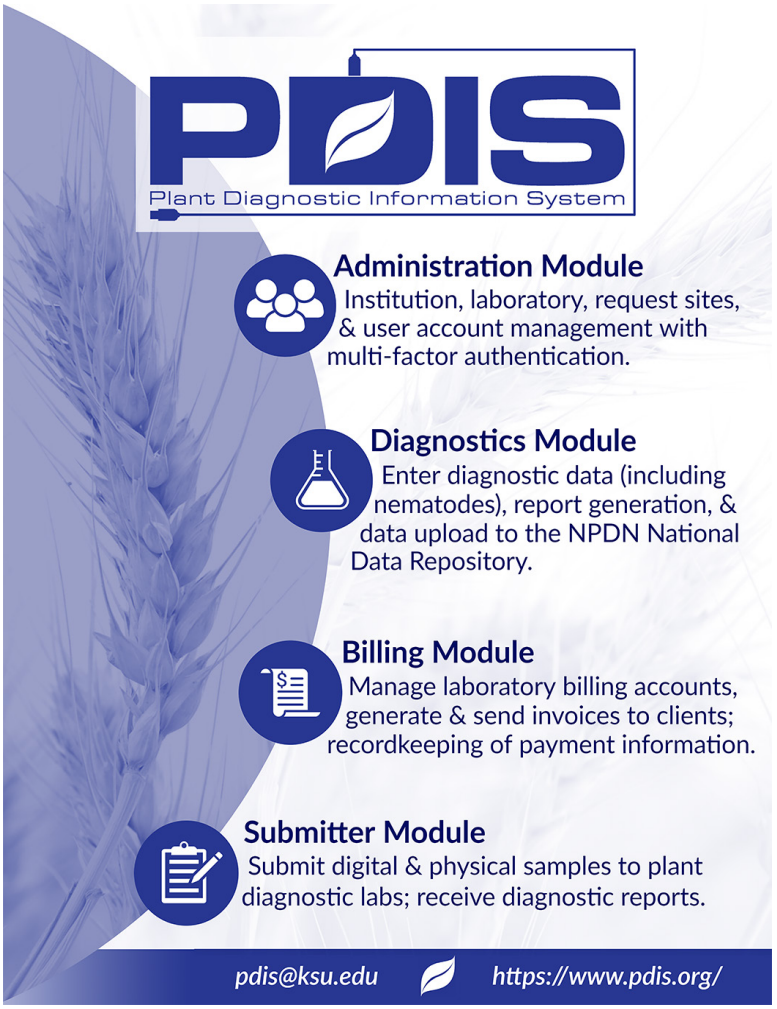


304 | FIVE YEARS YUMA PLANT HEALTH CLINIC

Dr. Johan Murcia; Rebecca Ramirez; Dr. Bindu Poudel-Ward

University of Arizona, Yuma County Cooperative Extension

The Yuma Plant Health Clinic is the diagnostic lab serving the community of Yuma County and beyond. Yuma, AZ also known as the winter salad bowl of the nation, produces 170 million servings of leafy greens every day from November-April. The sophisticated farming system also comes with a myriad of problems and plant disease is one of the major causes of economic loss to the farmers. The Yuma Plant Health Clinic serves as the to-go

diagnostic lab for Yuma county, with a quick turnaround time, helping stakeholders make important decisions in their cropping system. The plant clinic receives 200-300 dropoffs each year and analyzes over 1000 samples. The plant pathology program also does field diagnosis when requested. Molecular diagnosis is available to the community upon request. In the last 5 years, the plant pathology program has published six first reports with two more underway.

Contact info: Bindu Poudel-Ward, bpoudel@arizona.edu

NPDN COMMITTEES

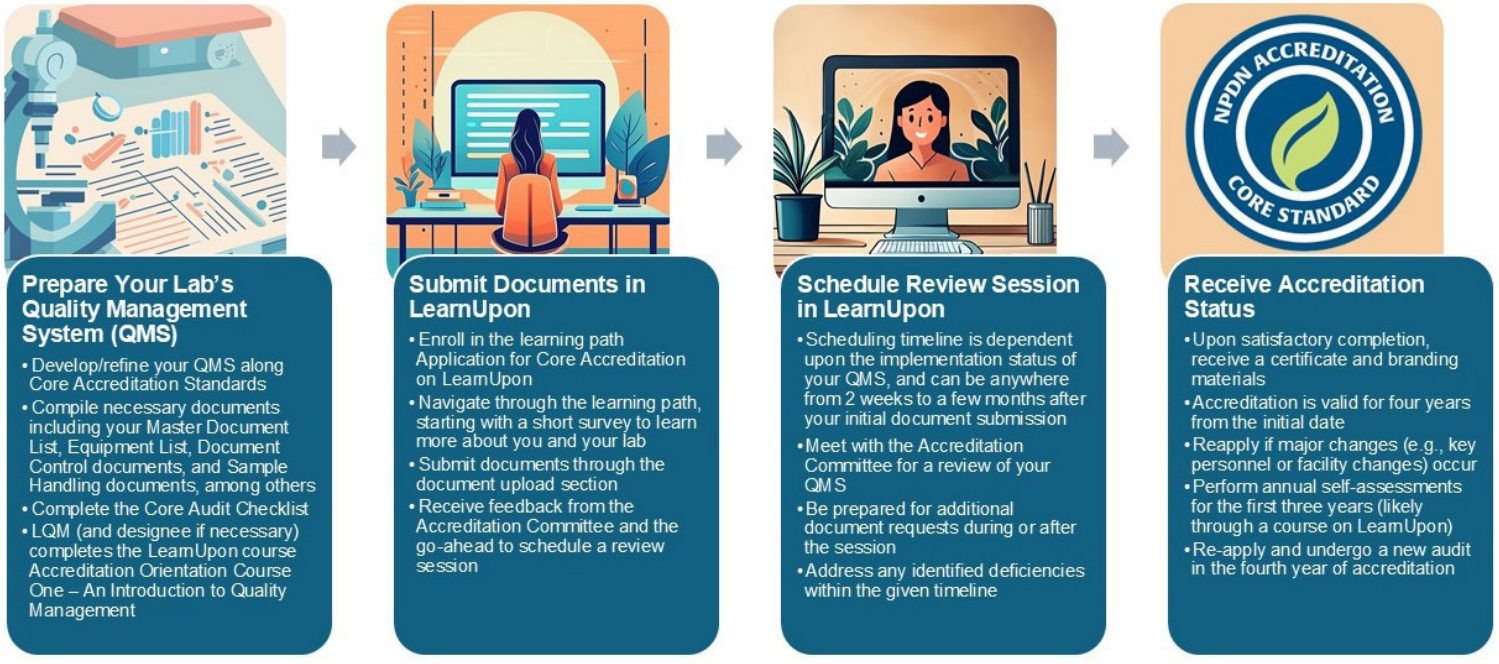
401 | NPDN CORE ACCREDITATION PROGRAM: YOUR TIME TO SHINE!

Stephanie A. Shea (1); Peng Tian (2); Jean Williams-Woodward (3); Colette Gabriel (4); Jan Byrne (5); Phillip Lujan (6); Karen L. Snover-Clift (7); Ann Hazelrigg (8); Jeffrey B. Jones (9); Shouhua Wang (10); Krishna Puri (11); Matias Reynoso (12); Timothy Burks (13); V. Hannah Ayala (14); Alejandra Jimenez Madrid (15); Tyler Edwards (16); Elizabeth Dorman (17)

(1) University of Maine, Orono, ME; (2) University of Missouri, Columbia, MO; (3) University of Georgia, Athens, GA; (4) Ohio Department of Agriculture, Reynoldsburg, OH; (5) Michigan State University, E. Lansing, MI; (6) New Mexico State University, Las Cruces, NM; (7) Cornell University, Ithaca, NY; (8) University of Vermont, Burlington, VT; (9) University of Florida, Gainesville, FL; (10) Nevada Department of Agriculture, Sparks, NV; (11) Missouri Department of Agriculture, Jefferson City, MO; (12) Colorado State University, Denver, CO; (13) Louisiana State University, Baton Rouge, LA; (14) Texas A&M University, College Station, TX; (15) University of Georgia, Tifton, GA; (16) University of New Hampshire, Durham, NH; (17) Michigan Department of Agriculture and Rural Development, E. Lansing, MI.

The NPDN Accreditation Committee created the Core Standard, a document that provides an overarching framework for all NPDN member laboratories. Each laboratory's development of a quality management system that meets the requirements of the Core Standard demonstrates our commitment to excellence in plant diagnostics. Core Accreditation ensures NPDN laboratories will meet quality standards and enhance professionalism, strengthening our state of readiness in performing timely and accurate detections while reducing the risk of exotic pathogens and pest establishments. The program recently launched, and your lab can now apply for Core Accreditation via LearnUpon. There are a few key deadlines to be aware of as you develop your quality management system and there are several resources available on the Accreditation Committee webpage to help you throughout the process. You are not alone, we are here to help you, and it is time to shine your light on quality diagnostics! Regardless of where you stand in your quality management system development and accreditation process, come see our poster for information that will get you one step closer to achieving accreditation!

Contact info: Contact info: Stephanie Shea, stephanie.shea@maine.edu



402 | NPDN LIMS COMMITTEE: ADAPTING TO CHANGES IN TECHNOLOGY

Andrew Daigle (1); Sherri Clark (2); Judy Dizon (3); Mike Hill (1); Arjun Khanal (3); Todd Powell (4); Daniel Nall (5); John VanDyk (6)

(1) CERIS, Purdue University, West Lafayette, IN; (2) Bartlett Tree Research Laboratory, Watkinsville, GA; (3) PDIS, Kansas State University, Manhattan, KS; (4) PClinic, Teaspoon Software, Clarksburg, MD; (5) North Carolina State University, Raleigh, NC; (6) Iowa State University, Ames, IA

The NPDN LIMS Technical Committee is comprised of representatives from the Laboratory Information Management Systems (LIMS) and the National Data Repository (NDR). This committee focuses on implementing changes to both the LIMS and NDR that will benefit all members of the network. Our poster will highlight past achievements and describe how technology was utilized to achieve efficiencies in the network. It will also emphasize how we are incorporating newer technologies into the network.

Contact info: Andrew Daigle, adaigle@purdue.edu

403 | NATIONAL DATA COMMITTEE UPDATE

Clarissa J. Balbalian (1); Matt Bertone (2); Tania Brenes- Arguedas (3); Tom Creswell (4); Tim Deppen (4); Erin Hill (5); Mike Hill (4); Jiahuai Hu (6); Jason A. Pavel (7); Lindsey Thiessen (8); Rick Turcotte (9)

(1) Mississippi State University, Starkville, MS; (2) North Carolina State University, Raleigh, NC; (3) University of California, Davis, California; (4) Purdue University, West Lafayette, IN; (5) Michigan State University, East Lansing, MI; (6) University of Arizona, Tucson, AZ; (7) University of Arkansas Extension, Fayetteville, AR; (8) USDA-APHIS, Raleigh, NC; (9) USDA Forest Service, Morgantown, WV

The National Data Committee meets monthly to support the quality and consistency of data in the NPDN National Data Repository (NDR). Since the December 2022 NPDN national meeting, the committee has produced six new guidelines to aid users in making well-informed decisions when entering diagnostic data and in understanding the data available in the NDR. The committee has reviewed and processed over 300 pest/host code requests, standardized thematic codes for multiple mixed species and unidentified entries, and assisted NPDN leadership in reviewing data requests.

Contact info: Clarissa Balbalian, cb237@msstate.edu

404 | NPDN PROFICIENCY COMMITTEE: ESSENTIAL PROFICIENCY PROGRAM RELEASE

Felicia Millett (1); Ann Hazelrigg (2); Allina Bennett (3); Nick Goltz (4); John Bonkowski (5); Ray Hammerschmidt (6); Carrie Harmon (3); Ansuya Jogi (7); Jeff Jones (3); Jennifer Olson (8); Jill Pollok (9); Karen Rane (10); Peng Tian (11)

(1) Connecticut Agricultural Experiment Station, New Haven, CT; (2) University of Vermont, Burlington, VT; (3) University of Florida, Gainesville, FL; (4) University of Connecticut, Storrs, CT; (5) Purdue University, West Lafayette, IN; (6) Michigan State University, East Lansing, MI; (7) University of Georgia, Athens, GA; (8) Oklahoma State University, Stillwater, OK; (9) University of Delaware, Newark, DE; (10) University of Maryland, College Park, MD; (11) University of Missouri-Columbia, Columbia, MO

Vsit our poster to chat about the new Essential Proficiency Program. In the future, diagnosticians contributing data to the National Data Repository (NDR) will be required to pass Essential Proficiency assessments housed in the Learning Management System (LMS). The assessments will measure a diagnostician's fundamental ability to determine appropriate diagnostic process and upload diagnostic information correctly to the National Data Repository (NDR). Currently there is a single course and assessment called Fundamentals of Plant Diagnostics, and additional courses are on their way! Coming up next is a course to support diagnostic determination and data upload. Scan the QR code on the poster to provide feedback about how Essential Proficiency will impact you and your lab.

Contact info: Felicia Millett, Felicia.Millett@ct.gov

405 | THE NPDN PROFESSIONAL DEVELOPMENT PROGRAM 5 YEARS IN; WHERE ARE WE NOW?

Brett Arenz (1); Allina Bennett (2); Nick Goltz (3); Ansuya Jogi (4); Ana Cristina Fulladolsa (5); Stephanie Shea (6); Andrew Daigle (7); Ann Hazelrigg (8); Chelsea Harbach (9); Karen Rane (10); Karen Snover-Clift (11); Cora Yates (12); Dorah Mwangola (13); Jean Williams-Woodward (4); Jen Olson (14); Todd Steinlage (15); Uta McKelvy (16); Felicia Millett (17)

(1) University of Minnesota, Saint Paul, MN; (2) University of Florida, Gainesville, FL; (3) University of Connecticut, Mansfield, CT; (4) University of Georgia, Athens, GA; (5) Colorado State University, Fort Collins, CO; (6) University of Maine, Orono, ME; (7) Purdue University, West Lafayette, IN; (8) University of Vermont, Burlington, VT; (9) Iowa State University, Ames, IA; (10) University of Maryland, College Park, MD; (11) Cornell University, Ithaca, NY; (12) Auburn University, Auburn, AL; (13) Bartlett Tree Research Laboratory, Charlotte, NC; (14) Oklahoma State University, Stillwater, OK; (15) Alaska DNR Division of Agriculture, Palmer, AK; (16) Montana State University, Bozeman, MT; (17) The Connecticut Agricultural Experiment Station, New Haven, CT

At the 2019 NPDN National Meeting in Indianapolis, IN, the Professional Development Working Group presented a proposed design for implementation of an NPDN Professional Development Program. Five years after selecting LearnUpon as the NPDN learning management system, the program features 60 online courses intended to meet the critical needs of diagnosticians in the NPDN network in the areas of onboarding, accreditation, diagnostics, database use and Lab Management System (LMS) proficiency. More courses are under development and the program also accepts new course recommendations from NPDN members. A continuing education credit model is under development to support the ongoing quest to document and track LearnUpon progress, incentivize participation, and document measurable outcomes of member efforts for annual reporting purposes.

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406 | OUTREACH AND EXTENSION (O&E) COMMITTEE: 2023-24 ACCOMPLISHMENTS AND WORK PLAN

Mahfuz Rahman (1); Zach Schumm (2); Tania Brenes-Arguedas (3); Jenny Glass (4); Joe LaForest (5); Mike Hill (6); Mary Ann Hansen (7); Kyle Broderick (8); Claudia Nischwitz (9); Kristen Wickert (10); Cora McGehee (11); Gino Grazino(12); Julie Beals (13); Jason Pavel (14); Christian Cumagun (15)

(1) West Virginia University, Morgantown, WV; (2) Iowa State University, Ames, IA; (3) University of California-Davis, Davis, CA; (4) Washington State University, Puyallup, WA; (5) University of Georgia, Tifton, GA (Bugwood); (6) Purdue University, West Lafayette, IN (CERIS); (7) Virginia Tech, Blacksburg, VA; (8) University of Nebraska-Lincoln, Lincoln, NE; (9) Utah State University; Logan, UT; (10) U.S. Forest Service, Morgantown, WV; (11) North Carolina State University, Raleigh, NC; (12) University of Alaska, Fairbanks, AK (13) University of Kentucky; Lexington, KY; (14) University of Arkansas; Fayetteville, AR: (15) University of Idaho, Parma, ID.

Outreach education and extension activities are key responsibilities of many NPDN members. The NPDN outreach and extension (O&E) committee works to make existing outreach materials available to NPDN members and creates and collects resources to fill known gaps. Recent focus of O&E initiatives has been to initiate the collection of resources from NPDN members in Bugwood.org that can be accessed and used by others for extension-related activities. Specifically, members will be receiving a call for presentation uploads soon, along with instructions on how to submit and format an appropriate presentation. Presentations can be focused on topics that fill gaps or cover a member's specific expertise that may be unique. Our hope is that NPDN members seize this opportunity to share resources that can be accessed and used by others. This will expand resource sharing and accessibility of information throughout the NPDN community and add to NPDN's existing O&E resources.

Contact info: Zach Schumm, zschumm@iastate.edu

NPDN & PARTNER ORGANIZATIONS

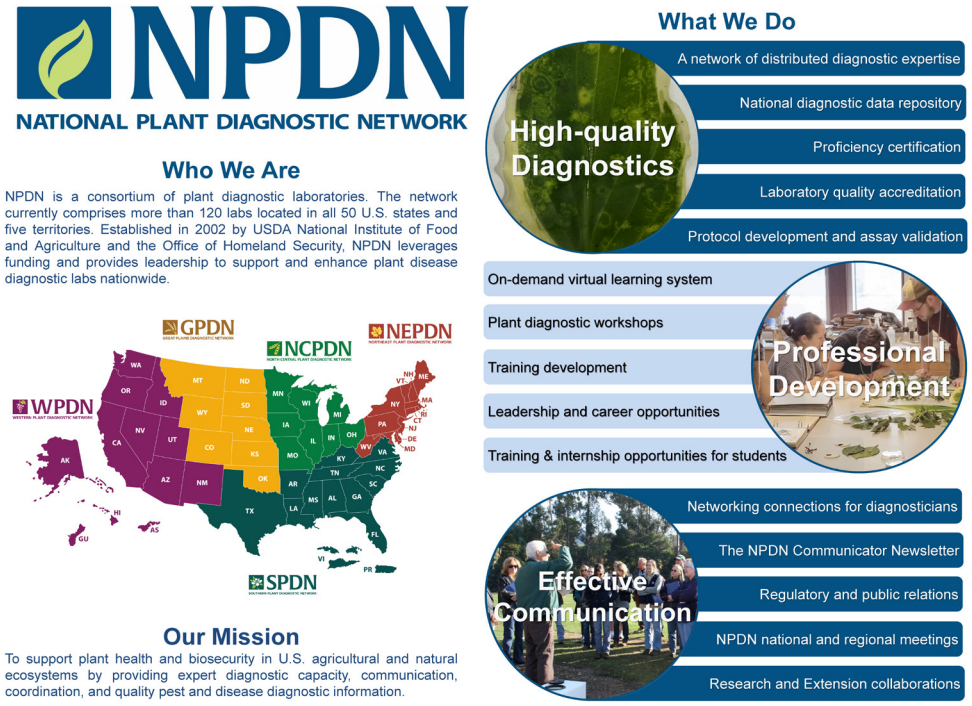
501 | A POSTER FOR BETTER COMMUNICATION: WHAT IS NPDN?

NPDN Communications Committee members: Clarissa Balbalian (1); Allina Bennett (2); Tania Brenes-Arguedas (3); Kyle Broderick (4); Andrew Daigle (5); Ana Cristina Fulladolsa (6); Yonghao Li (7); Angela Madeiras (8); Keiddy Urrea-Morawicki (9); Shouhua Wang (10); Xiao Yang (11)

(1) Mississippi State University, Starkville, MS; (2) University of Florida, Gainesville, FL; (3) University of California, Davis, CA; (4) University of Nebraska, Lincoln, NE; (5) Purdue University, West Lafayette, IN; (6) Colorado State University, Fort Collins, CO; (7) The Connecticut Agricultural Experiment Station, New Haven, CT; (8) University of Massachusetts, Amherst, MA; (9) The University of Rhode Island, Kingston, RI; (10) Nevada Department of Agriculture; Sparks, NV; (11) Clemson University, Pendleton, SC

The National Plant Diagnostic Network (NPDN) is a consortium of plant diagnostic laboratories. The network currently comprises more than 120 labs located in all 50 U.S. states and five territories. Established in 2002 by USDA National Institute of Food and Agriculture and the Office of Homeland Security, NPDN has played an important, multifaceted role in safeguarding the health of our agricultural and natural ecosystems, protecting the bio- and informational security in the U.S., generating new plant diagnostic knowledge, facilitating the communication of plant pest and disease information, and training next-generation plant diagnosticians and scientists. Despite making significant contributions to plant health and sciences in the U.S., NPDN faces various challenges. A particular challenge is effectively communicating with a diverse range of stakeholders from regulatory officials, law makers, and sponsors, to research communities, students, and commercial and residential plant growers. The effectiveness of such communications has a huge impact on the network's recognition, reputation, and sustainability. The purpose of this poster, a collaborative work of the NPDN Communications Committee's members, is to provide NPDN labs with a useful resource for generic communication purposes with a wide array of stakeholders. NPDN members can use this poster to provide NPDN's information and answer questions such as: What is NPDN?, Why is NPDN important to me?, and How can I help NPDN to provide even better services?. A scannable QR code is provided, so NPDN members can download the editable poster file and customize it for their own labs.

Contact info: Xiao Yang, xyang7@clemson.edu



Find the new NPDN poster on display in this meeting. Download a copy for your own lab using this QR code.

502 | DIAGNOSTIC ASSAY VALIDATION NETWORK VALIDATION TOOLS AND RESOURCES

Poonam Sharma (1); Carrie L. Harmon (2); Deborah Groth-Helms (3); Kitty F. Cardwell(1)

(1) Oklahoma State University, Stillwater, Oklahoma; (2) University of Florida, Gainesville, Florida; (3) AgDia, Elkhart, IN

The Diagnostic Assay Validation Network (DAVN.org) is designed to support research and deployment of validated plant disease diagnostic assays. We are excited to share performance metrics statistical tools and databases and other resources for the community.

This poster invites you to dig into the DAVN webpage to use the resources released in the past year:

Validation statistical calculators housed at https://www.apsnet.org/DAVN/Tools/Calculators/Pages/default.aspx. These standalone online calculators help assay developers and validators calculate test performance values. This test performance data will help validators objectively evaluate diagnostic tests for various applications.

Assay developers and end-users will benefit from two searchable databases: 1. Nucleic acid (NA) extraction database, now live and publicly accessible here - https://www.apsnet.org/DAVN/Lists/NucleicAcidExtraction/Allitemsg.aspx. This database provides comprehensive information on NA extraction methods/techniques, kits, and equipment used depending on host, matrix, and purpose of the study reported in peer reviewed publications in plant pathogen diagnostic assays since 2011. 2. Assay controls (internal exogenous/endogenous, positive, negative) based on the assay developed. Our newly-updated Knowledge center houses all the DAVN webinars, publications, PhytoFrontiers focus issues and more at https://www.apsnet.org/DAVN/Knowledge/Pages/default.aspx.

And finally, find an online community to find fellow researchers and practitioners. Join the APS-DAVN community to find fellow population or pathogen researchers, scientists who conduct ring-testing, and general support for and discussion of diagnostic assay development and validation.

Contact info: Poonam Sharma, poonam.sharma@okstate.edu

503 | EFILE AND PERMITS FOR NPDN LABS: A DIAGNOSTICIAN'S RESOURCE TO UNDERSTANDING PPQ PERMITS AND APPLYING FOR A PPQ 526 PERMIT USING THE EFILE SYSTEM

Samantha E. Fieweger (1); Elizabeth A. Dorman (2); Carrie L. Harmon (3); Jennifer Olson (4)

(1) Wisconsin Department of Agriculture, Trade, and Consumer Protection, Madison, Wisconsin; (2) Michigan Department of Agriculture and Rural Development, East Lansing, Michigan; (3) University of Florida, Gainesville, FL; (4) Oklahoma State University, Stillwater, Oklahoma

As diagnosticians, understanding the nuances of regulatory permitting required for our laboratories can be daunting. The change of the federal permitting system from ePermits to eFile requires laboratories to re-apply for and renew PPQ 526 permits in a new portal. The NPDN Regulatory Relations Committee developed the eFile and Permits for NPDN Labs resource to help diagnosticians navigate applying for a PPQ 526 permit using eFile and determining if your laboratory needs additional PPQ research permits.

Contact info: Samantha Fieweger, sam.fieweger@wisconsin.gov

504 | THE PPCDL WORKSHOPS; EVER-CHANGING TO MEET NEW CHALLENGES THAT RESULT IN NATION-WIDE REWARDS

Karen L. Snover-Clift (1); Gem E. Santillana (2), Eric A. Newberry (2); Yazmin Rivera (2); and Barb Riker (1)

(1) Cornell University, Ithaca, NY; (2) USDA-APHIS-PPQ-S&T Plant Pathogen Confirmatory Diagnostics Laboratory, Laurel, MD

The NPDN laboratories and staff are USDA's primary resource for nationwide diagnostic surge capacity during plant health emergencies. Since 2003, the PPCDL Scientists have provided annual workshops to prepare a diagnostic workforce that responds to outbreaks rapidly, prepares for and performs critical laboratory procedures, and communicates results effectively, efficiently and accurately to appropriate contacts. The first workshop was offered in 2003 at a Biosecurity Level-3 site, providing hands-on experience with soybean rust, a select agent plant pathogen threatening the US border at that time. The PPCDL Workshops have become the primary professional development activity for diagnostic laboratory staff interested in learning techniques and methods specifically targeting regulatory pathogens. The workshops have grown to 8-12 topics annually, grouped into a 4-6-week training period, with an expanded format to include both in-person and virtual trainings, and most recently, an online Best Laboratory Practices workshop required of all those wanting to attend any PPCDL Workshop. Challenges on the horizon will address preparing participants for specific topics through the development of basic knowledge preparation courses and identifying priority participants using an improved registration process. Over the 22-year history, twenty-five (25) topics have been developed and presented in 131 individual workshops, requiring 327 days of training for 1,181 participant workshop completions. These training events play a key role in protecting our nation from newly introduced and highly significant plant pathogens by preparing diagnosticians in every state across the nation.

Contact info: Karen Snover-Clift, kls13@cornell.edu

505 | WHAT'S NEW IN THE LEARNING MANAGEMENT SYSTEM? EVERYTHING YOU NEED TO KNOW ABOUT THE PPCDL WORKSHOPS!

Karen L. Snover-Clift (1); Gem E. Santillana (2), Eric A. Newberry (2); Yazmin Rivera (2); Allina Bennett (3), Matthew Stern (4); and Barb Riker (1)

(1) Cornell University, Ithaca, NY; (2) USDA-APHIS-PPQ-S&T Plant Pathogen Confirmatory Diagnostics Laboratory, Laurel, MD; (3) University of Florida, Gainesville, FL; (4) Consult Services, Storrs, CT

The PPCDL Workshops have become an integral part of our NPDN members and partners professional development. Those that have taken workshops and those interested in learning about these training opportunities have a lot of questions about the process of planning and attending the PPCDL Workshops. A new, online professional development course was created in the NPDN's Learning Management System to answer some of the most asked questions. The course, An Introduction to the PPCDL Workshops, also highlights the uniqueness, importance, and benefits of these annually offered, regulatory focused, diagnostic workshops. The course contains pre-course and post-course testing and six brief videos, each a module within the course. The entire course should be completed in less than 45 minutes or if the learner does not have a large block of time, they can pick away at the course, completing a module or section of a module at any time. The topics covered in each module are; 1. why the workshops were created and how they have grown over the past two-plus decades, 2. who teaches and who participates, 3. how topics are selected, 4. where and what materials are posted within the NPDN Portal that help participants learn about available workshops, plan for their workshop(s) and submit their travel expense reimbursement requests; 5. the timeline of when each step of the process occurs such as the release of an annual topics needed survey and the opening of registration, and 6. a review of an all-inclusive guidelines document that provides step by step information on what to do before and after registering for a workshop and after attending their workshop.

Contact info: Karen Snover-Clift, kls13@cornell.edu

506 | MORPHOLOGICAL FUNGAL IDENTIFICATION TECHNIQUES (MFIT) WORKSHOP; USING FOUNDATIONAL TECHNIQUES TO PREPARE DIAGNOSTICIANS FOR FUTURE CHALLENGES

Karen L. Snover-Clift (1); Megan K. Romberg (2), John M. McKemy (2), Karen K. Rane (4); Allina Bennett (3), Barb Riker (1)

(1) Cornell University, Ithaca, NY; (2) USDA-APHIS-PPQ-National Identification Services, Beltsville, MD; (3) University of Florida, Gainesville, FL; (4) University of Maryland, College Park, MD

The National Plant Diagnostic Network (NPDN) members and partners are at the front lines of efforts to provide early detection of fungal plant pathogens and to support rapid response. Fungal plant pathogens comprise the largest group of plant disease-causing organisms. It is not possible to have molecular and serological detection assays for all potential fungal plant pathogens of concern, therefore, incorporating morphological techniques is essential to establishing a fully proficient diagnostic program. The Morphological Fungal Identification Techniques Workshop (aka MFIT) was developed by USDA-APHIS-PPQ-NIS Scientists and first offered in 2024, to improve diagnosticians' abilities to recognize and quickly respond to newly arrived pathogens that could impact agriculture and the environment. Techniques presented and practiced in the workshop provide the tools needed to accurately identify groups across the fungal kingdom by focusing on foundational knowledge and fungal recognition including understanding current and historical literature as well as nomenclatural changes. The first year offering of the MFIT Workshops provided three full days of training to 15 workshop participants in two workshop session. The sessions were filled within one hour of opening registrations, clearly indicating the demand for this training. Planning for the 2025 MFIT Workshops is underway and will include improvements that will require completion of a pre-workshop online course through NPDN's Learning Management System (LearnUpon) so diagnosticians arrive at the in-person workshops with an understanding of terminology and fungal structures.

Contact info: Karen Snover-Clift, kls13@cornell.edu

507 | NPDN CONNECTIONS

Allina Bennett (1); Carrie L. Harmon (1); Jenny Glass (2); Cassandra Bates (3); Chelsea Harbach (4); Raghuwinder Singh (5)

(1) University of Florida, Gainesville, FL; (2) Washington State University, Puyallup, WA; (3) Washington State University, Pullman, WA; (4) Iowa State University, Ames, IA; (5) Lousiana State University, Baton Rouge, LA

In partnership with the general session panel, Feeding the Professional Pipeline: Building Future Diagnosticians in a Changing World, the NPDN Connections Poster will highlight the path that our many members have taken in their diagnostic career and the connections they have made along the way. During breaks and poster sessions, visit the NPDN Connections display and make your mark! Use color coded stickers to indicate your history in diagnostics and show your unique journey by connecting these areas along a line. Scan the QR code to access a Thankbox and send thanks to those who have helped along the way.

Contact info: Allina Bennett, allina.bennett@ufl.edu

NPDN COMMITTEES

Learn more about NPDN Committees and join today!

Accreditation Committee — accreditation@npdn.org

The mission of the Laboratory Accreditation committee is to develop a sustainable accreditation program that includes a system with priority focus placed on the core level since all laboratories will be expected to obtain a minimum core level of accreditation. Although the focus will be placed on the core level, the working group will develop an accreditation system. The working group will recommend lab accreditation policy and develop a structure that benefits the entire network by creating a system focused on plant diagnostics.

Communications Committee — communications@npdn.org

The NPDN Web Portal is the public face of NPDN, and an important communication tool for NPDN members, partners, and stakeholders. This committee will serve as the long-term curator of NPDN web portal content to ensure clear online communication with members and stakeholders.

National Data Committee — data@npdn.org

The mission of the NPDN National Data Committee is to support the quality and consistency of the data in the NPDN National Data Repository by providing clear data entry guidelines, standard terminology, and guidance on problem/pest/host dictionary entries.

Outreach and Extension Committee — outreach@npdn.org

The miss ion of the NPDN Outreach and Extension Committee is to support plant health promotion and outreach. Outreach education and extension involves the knowledge transfer of key information relevant to plant health and its safeguarding. These activities are facilitated by NPDN members, who interact with audiences in the agriculture and green industries, the public, and higher education. Outreach education and extension activities are important to the NPDN mission as they raise the visibility of the network and are often key day-to-day responsibilities of our members. This committee will support outreach and extension activities of NPDN members by providing resources to reduce the burden associated with information gathering and dissemination.

Professional Development Committee — prof_dev@npdn.org

The mission of the NPDN Professional Development Committee is to support and foster the development of the NPDN Professional Development Program. This committee will ensure the continued availability and quality of NPDN professional development training. The committee will establish and maintain achievable professional development standards for NPDN members that will be developed into NPDN policy. The group will work to facilitate the transfer of expertise from all members to new and incoming members, as well as contribute to the ongoing growth of existing members.

Proficiency Committee — proficiency@npdn.org

The mission of the NPDN proficiency committee is to provide the framework for meaningful and achievable proficiency standards and verification methods in order to ensure that NPDN diagnosticians are proficient in current diagnostic techniques and able to identify appropriate techniques. The proficiency standards and verification methods will improve diagnostic capability of the NPDN laboratories, while providing useful information to diagnosticians and laboratories.

Protocols and Validation Committee — protocols@npdn.org

The protocol and validation (P&V) committee will facilitate the access by NPDN labs to a range of validated, fit-for-purpose diagnostic protocols that utilize the latest technologies. The committee will encourage and facilitate protocol and equipment harmonization where appropriate and through outreach efforts, promote best practices for protocol development, validation, and deployment.

Regulatory Relations Committee — regulatory@npdn.org

The mission of the NPDN Regulatory Relations Committee is to support and foster the relationships of NPDN with our regulatory partners. This committee will ensure NPDN members are aware of communications protocols and the roles of regulatory partners in plant biosecurity, and that NPDN regulatory partners are aware of NPDN responsibilities and activities.

To learn more about our committees, go to: https://www.npdn.org/npdn-committees (member login required)
https://www.npdn.org/committee_directory (login not required)

NATIONAL MEETING ORGANIZING COMMITTEE

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Stephanie Shea
NEPDN, University of Maine

Jan Byrne
NCPDN, Michigan State University

Carrie Lapaire Harmon
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Raghuwinder Singh
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NCPDN, Iowa State University

Raghuwinder Singh
SPDN, Louisiana State University

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SPDN, University of Florida

Angela Madeiras
NEPDN, University of Massachusetts

With help from the NPDN Communications Committee

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SPDN, Mississippi State University

WORKSHOPS & FIELD TRIPS SUB-COMMITTEE

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NEPDN, University of Vermont

Chandler Day
GPDN, Kansas State University

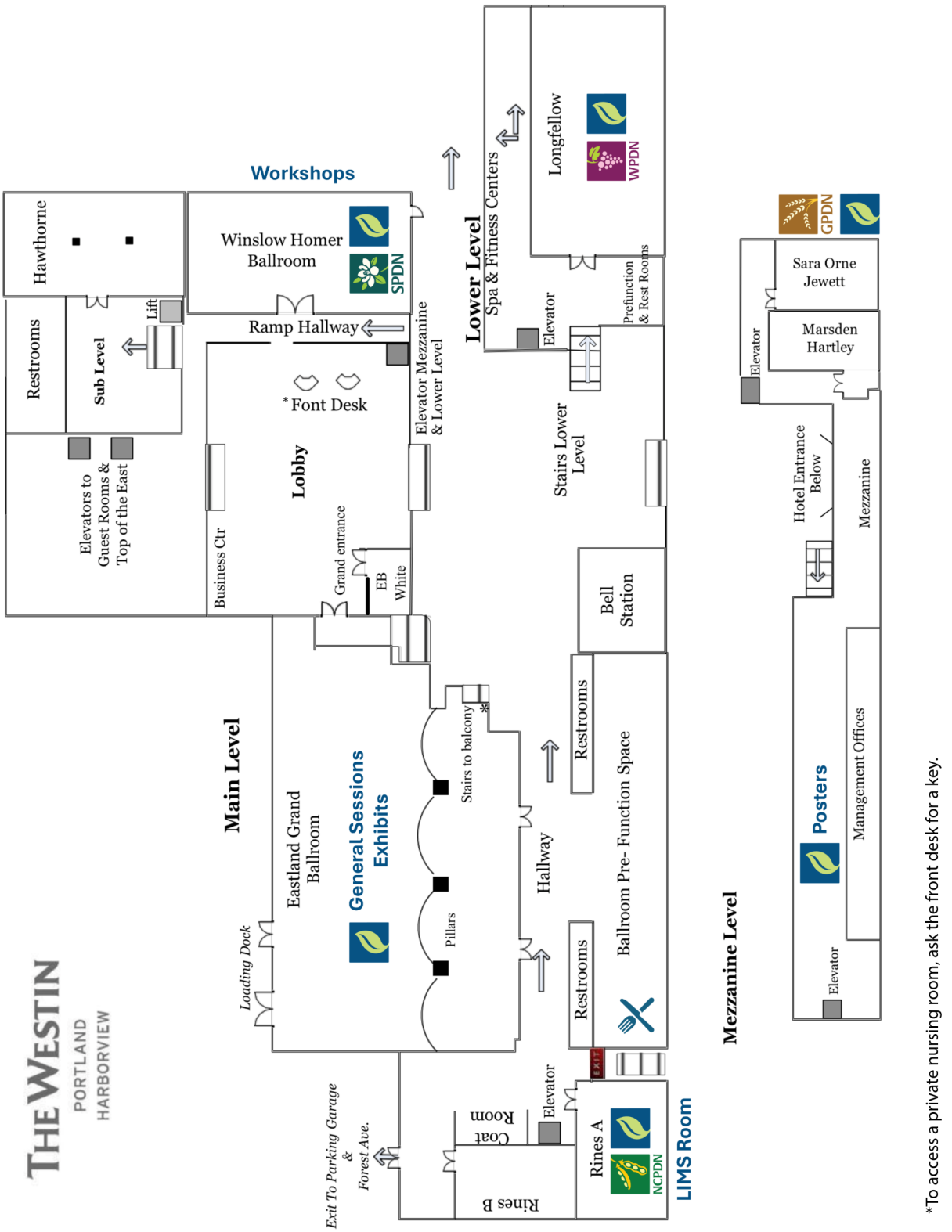
Alejandra Jimenez Madrid
SPDN, University of Georgia

Matt Bertone
SPDN, North Carolina State University

Felicia Millett
NEPDN, Connecticut Agricultural Experiment Station

INFORMATION & MAPS

MEETING EVENT SPACE



*To access a private nursing room, ask the front desk for a key.

AREA INFORMATION

CUMBERLAND COUNTY INFORMATION

VISIT PORTLAND

LOCAL EATING

LOCAL ATTRACTIONS

PORTLAND GREATRUNS

Looking to get out for a run? Pick from one of the many routes in beautiful Portland

SELF GUIDED WALKING TOURS

— Area Code of all of Maine is (207) —

RESTAURANTS

207 Bar & Restaurant (D7) 337 Cumberland Ave, 613-9330 *World cuisine, African, Caribbean*

Andy's Old Port Pub (G9) 94 Commercial St, 874-2639 *Pub fare, Seafood, Pizza*

Becky's Diner (G5) 390 Commercial St, 773-7070 *American, Seafood*

Bite Into Maine (J2) Ft. Williams Park (Food Truck), 1000 Shore Rd, Cape Elizabeth \ (M4) 185 US Rt One, Scarborough (The Commissary), 289-6142 *Lobster rolls + more*

BlueFin (F8) 468 Fore St, (207) 775-9090 *American, Local, Seafood*

Boone's Fish House & Oyster Room (G9) 86 Commercial St, 774-5725 *Lobster, Fresh fish*

Bull Feeney's (F8) 375 Fore St, 773-7210 *Seafood, Steaks, Irish Pub*

Chebeague Island Inn Restaurant & Bar (M10) 61 South Rd, Chebeague Island, 846-5155 *American, Local, Seafood*

Congress Squared (D6) 157 High St, 517-8831 *American, Local, Fresh*

Copper Branch (G7) 5 Canal Plaza, 747-4676 *Vegan, Whole Foods, Organic*

The Corner Room Kitchen & Bar (E9) 110 Exchange St, 879-4747 *Italian-inspired, Casual*

Cracker Barrel (B2) 357 Maine Mall Rd, South Portland,773-7530 *Southern comfort, Homestyle*

David's Restaurant (E7) 22 Monument Sq, 773-4340 *Current cuisine, Seafood, Fine cuisine*

Diamond's Edge Restaurant (M8) Diamond Cove, 766-5850 *American, Seafood*

DiMillo's On the Water (G8) 25 Long Wharf, 772-2216 *Seafood, Lobster, Steaks*

East Ender Restaurant & Bars (F10) 47 Middle St, 879-7669 *Seafood, New American*

Eighteen95 Restaurant (F8) 20 Milk St, 774-4200 *American, Seafood, Vegetarian*

Evo Kitchen + Bar (F7) 443 Fore St, 358-7830 *Seafood, Local, Vegetarian*

Flatbread Company (G9) 72 Commercial St, 772-8777 *All natural pizza*

Fore Street Restaurant (G9) 288 Fore St, 775-2717 *American, Seafood, Local*

The Front Room (F12) 73 Congress St, 773-3366 *Brunch, Comfort food*

Gilbert's Chowder House (G9) 92 Commercial St, 871-5636 *Maine seafood*

The Grill Room & Bar (F9) 84 Exchange St, 774-2333 *Woodfired steak, Fish, Pizza*

Gritty's Portland Brew Pub (F8) 396 Fore St, 772-2739 *American, English Pub*

J's Oyster (G8) 5 Portland Pier, 772-4828 *Seafood*

Leonardo's Pizza (C9) 415 Forest Ave, 775-4444 *Pizza, Wings, Salads*

Linda Bean's Maine Kitchen (K12) 88 Main St, Freeport, 865-9835 *Seafood, Lobster*

Lobster Shack at Two Lights (O5) 225 Two Lights Rd, Cape Elizabeth, 799-1677 *Seafood, Lobster*

Luke's Lobster Portland Pier (G8) 60 Portland Pier, 274-6097 *Seafood, Lobster*

Miss Portland Diner (D9) 140 Marginal Way, 210-6673 *Diner fare, Comfort food*

Moe's Original BBQ (B3) 209 Western Ave, South Portland, 956-7623 *BBQ*

Noble Barbecue (A12) 1706 Forest Ave, 536-1395 *BBQ*

Old Port Sea Grill and Raw Bar (G9) 93 Commercial St, 879-6100 *Fresh seafood, Raw bar*

Old Port Slice Bar (F7) 420 Fore St, 899-3364 *New York style pizza*

Olive Cafe (G9) 127 Commercial St, 772-6200 *Lebanese, Mediterranean*

Otto Pizza (F11) 225 Congress St, 358-7870 \ (B11) 250 Read St, 358-7551 *Elevated pizza experience*

Petite Jacqueline (D5) 46 Market St, 553-7044 *French Bistro fare*

Pom's Thai Restaurant (B3) 209 Western Ave, South Portland, 347-3000 *Authentic Thai food*

Pom's Thai Taste Restaurant & Noodle House (B3) 571 Congress St, 772-7999 *Authentic Thai food*

Porthole Restaurant & Pub (G9) 20 Custom House Wharf, 773-4653 *American, Seafood, Local*

Portland Lobster Company (G8) 180 Commercial St, 775-2112 NE *Seafood in the rough*

Ri Ra Irish Pub & Restaurant (G9) 72 Commercial St, 761-4446 *Irish Bistro, Pub fare*

Ricetta's Brick Oven Ristorante (L8) 240 US Route One, Falmouth, 781-3100 *Pizza, American*

Rosie's Restaurant and Pub (G9) 330 Fore St, 772-5656 *Pub fare, Seafood*

Scales (H9) 68 Commercial St, 805-0444 *Local, New England Seafood*

Sea Glass at Inn by the Sea (O5) 40 Bowery Beach Rd, Cape Elizabeth, 799-3134 *New American, Local*

Street and Company (F8) 33 Wharf St, 775-0887 *Fresh, Local, Seafood*

Sur Lie (E8) 11 Free St, 956-7350 *Contemporary American Tapas*

Thai Taste Restaurant (I3) 435 Cottage Rd, South Portland, 767-3599 *Authentic Thai food*

Union Restaurant (E9) 119 Exchange St, 808-8700 *Farm/Sea to table*

COFFEE + TEA, BAKERIES

Bard Coffee (F8) 185 Middle St, 899-4788

Coffee By Design (E11) 1 Diamond St, 874-5400 \ (F10) 67 India St, 780-6767 \ (D6) 620 Congress St, 772-5533

Dobra' Tea (E9) 89 Exchange St, 210-6566

Higher Grounds (F8) 45 Wharf St, 536-7550

Gorgeous Gelato (F8) 434 Fore St, 699-4309

Holy Donut (G8) 194 Park Ave, 874-7774 \ (G8) 177 Commercial St, 331-5655

Soakology (D7) 511 Congress St, 879-7625

Two Fat Cats Bakery (F10) 195 Lancaster Street, 347-5144

LIBATIONS

Businesses marked with a ★ offer tours

★ **Allagash Brewing Company** (A12) 50 Industrial Way, 878-5385

Blyth & Burrows (F8) 25 Exchange St, 613-9070

Bow Street Beverage (C9) 495 Forest Ave, 228-2024

Cellardoor Winery Portland (F10) 127 Middle St, 536-7700

★ **Geary Brewing Company** (A12) 38 Evergreen Dr, 878-2337

★ **Hardshore Distilling Co.** (E12) 53 Washington Ave, 536-0592

★ **Island Dog Brewing** (B2) 125 John Roberts Rd, Unit 15, South Portland, 747-5258

Lone Pine Brewing Company (D12) 219 Anderson St, Unit 4, 536-4952

★ **Maine Brews Cruise** (G9) 79 Commercial St, Old Port Spirits, 200-9111

★ **Maine Distilleries/Cold River Vodka** (K12) 437 US Route 1, Freeport, 865-4828

Mast Landing Brewing Company (A8) 920 Main St, Westbrook, 887-9147

Portland Beer Hub (G9) 320 Fore St, 956-7322

★ **Rising Tide Brewing Company** (E11) 103 Fox St, 370-2337

Shipyard Brewing Co (F11) 86 Newbury St, 800-BREW-ALE

★ **Stroudwater Distillery** (C5) 4 Thompson's Point, 536-7811

Sweetgrass Winery & Distillery Tasting Room and Shop (G9) 324 Fore St, 761-8446

The Bar (F8) 8 Exchange St, 899-3333

★ **Three of Strong** (D11) 35B Diamond St, 899-4930

Urban Farm Fermentory (D12) 200 Anderson St, 773-8331

SHOPPING

GALLERIES + JEWELRY

Chilton Furniture (G9) 100 Commercial St, 653-7514

Edgecomb Potters (F7) 145 Commercial St, 780-6727

Maine Craft Portland (D7) 521 Congress St, 808-8184

Brown Goldsmiths (K13) 11 Mechanic St, Freeport, 865-4126

Chart Metalworks (F7) 1 Pleasant St, 221-6807

SPECIALTY FOODS + BEVERAGES

Bow Street Beverage (C9) 495 Forest Ave, 228-2024

Browne Trading Company (G7) 262 Commercial St, 775-7560

Dean's Sweets (F7) 475 Fore St, 899-3664

Dobra' Tea (E9) 89 Exchange St, 210-6566

FIORE Artisan Olive Oils and Vinegars (K13) 642 Congress Street, 801-8978

Harbor Fish Market (G9) 9 Custom House Wharf, 775-0251

Haven's Candies (A5) 87 County Rd, Westbrook, 772-1557 \ (C9) 448 Forest Ave, 772-0761

Len Libby Candies (L3) 419 US Route 1, Scarborough, 883-4897

Maine Lobster Now (C1) 58 City Line Dr, 799-8222

Old Port Candy Co. (F8) 422 Fore St, 772-0600

Skordo (F9) 372 Fore St, 536-4475 \ (B2) 364 Maine Mall Rd, South Portland, 888-9269

Stonewall Kitchen (F8) 182 Middle St, 879-2409

Vena's Fizz House, online only temporarily, 747-4901 venasfizzhouse.com

SPECIALTY RETAIL

The Blue Lobster (F8) 177 Commercial St, 805-1888

Casablanca Comics (F9) 151 Middle St, 780-1676

Higher Grounds (F8) 45 Wharf St, 536-7550

The Honey Exchange (B10) 494 Stevens Ave, 773-9333

L.L.Bean (K13) Main St, Freeport 877-755-2326

Liberty Graphics (G8) 10 Moulton St, 589-4596

Life is Good (F8) 428 Fore St, 253-5048

Lisa-Marie's Made in Maine (F8) 35 Exchange St, 828-1515

The Maine Mall (B2) 364 Maine Mall Rd, South Portland, 828-2063

The Maine Souvenir Shop (G8) 28 Milk St, 200-9655

Old Port Card Works (G8) 3 Moulton St, 773-5181

Ports of Call (G9) 83-85 Commercial St, 773-3411

Renys (E6) 540 Congress St, 553-9061

Sea Bags (G9) 123 Commercial St, 835-0096 \ (G9) 25 Custom House Wharf, 221-8700

Shipwreck & Cargo (G8) 207 Commercial St, 828-8065

Simply Scandinavian (E8) 19 Temple St, 874-6768

Treehouse Toys (F8) 47 Exchange St, 888-560-TOYS

Uncommon Paws (F8) 13 Exchange St, 888-549-7297

Wellness Connection of Maine (D5) 685 Congress St, 553-9003

PAMPERING & STYLE

Cosmetic Enhancement Center of New England, (B6) 1945 Congress St, 761-0177

Float Harder (D14) 500 Washington Ave, 400-5187

Soakology (D7) 511 Congress St, Ste 105, 879-7625

CURRENCY EXCHANGE

Old Port Foreign Exchange (B5) 1001 Westbrook St, (in airport), 618-5333

TD Bank - Foreign Currency Exchange 1 Portland Sq, (F8), 317-8816 \ 481 Congress St, (E7), 761-8711

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