11TH INTERNATIONAL IPM SYMPOSIUM

2025

Pest Management in Changing Environments

MARCH 3 - 6, 2025

PARADISE POINT | SAN DIEGO, CA

Welcome

Welcome to the 11th International IPM Symposium!

As our team constructed the 2025 program, it became evident that the IPM science and practitioner communities are working at a nexus of major global issues – food security and supply, human health, and environmental quality. We are seeing increasingly frequent extreme weather events and more rapid movement of pests and diseases globally, along with the increasing human health impacts that come with those changes. Collectively, we recognize the need to adapt pest management programs to these challenges, and this year's event reflects the urgent need for change.

The 11th International IPM Symposium will address this wide range of global challenges. Dr. James Farrar, Director of the University of California's Statewide IPM Program, will set the tone as he discusses *Current Issues and Future Opportunities for IPM*, followed by concurrent sessions, poster presentations, and networking opportunities thoughtfully put together to inspire transformation.

The concurrent sessions have been designed for IPM practitioners, growers, educators, consultants, researchers, industry professionals, students, and employees of non-governmental organizations to highlight new directions and methods that will help us keep pest management practices agile and effective as environments change. Hot topic sessions include biocontrol, AI, and emerging vectors and pathogens. Dedicated sessions for students and early career scientists will provide opportunities for future IPM trailblazers to describe their ongoing work. And as a special contribution, Lifetime IPM Achievement Award winners will deliver presentations on their work during the closing plenary session. In addition to the session talks, there will be poster presentations that include both student posters submitted for the Student IPM Inspiration Award and posters submitted by established professionals from a wide variety of IPM backgrounds.

To conclude the Symposium, participants will hear from our two Lifetime IPM Achievement Award winners, Dr. Ulrich Kuhlmann, Executive Director, Global Operations, CABI and Dr. Peter Mason, Research Scientist, Agriculture and Agri-Food Canada after which the student IPM Inspiration Award winners will be announced. Two post-symposium events will be offered to give attendees an opportunity extend their learning further: The *IPM Evaluation Workshop*, conducted by David Lane, evaluation specialist at the Northeastern IPM Center, and Tegan Walker, evaluation specialist at the Southern IPM Center; and the *Rodent Workshop*, hosted by Janet Hurley, ACE, Senior Extension Program Specialist, Texas A&M AgriLife Extension Service and Dr. Matthew Frye, Community IPM Extension Educator, New York State Integrated Pest Management. We also hope you take some time to enjoy the local area, which starts with several carefully curated field trips offered as part of the Symposium's special events.

Welcome

And before we let you go, we want to take this opportunity to thank our numerous volunteer committee members for their work and dedication as well as our sponsors, organizers, moderators, and presenters for making the 11th International IPM Symposium a truly special event. We especially want to acknowledge Kelly Adams, Marnie McMullin, Elaine Wolff, Moira Mackesey-Green, and Ben Hopper, who have gone above and beyond to make this event a success. As the Chairs of this year's Symposium, we are delighted to welcome you to a week of learning, networking, and reconnecting with colleagues from all over the world in lovely San Diego.

Enjoy!




Deborah Grantham Dawn Gouge Janet Hurley Shannah Whithaus

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We thank our sponsors and exhibitors for their generous support for IPM and the IPM symposium

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General Information

Registration & Information Desk

Symposium registration/check-in is located in the Paradise Foyer, near the main entrance (Porte Cochere) of the Conference Center at Paradise Point Resort.

Registration will be open during the following hours, PST:

- Monday, March 3, 10:00 am - 5:00 pm
- Tuesday, March 4, 7:00 am – 4:30 pm
- Wednesday, March 5, 7:00 am – 4:30 pm
- Thursday, March 6, 7:00 am - 12:00 pm

Dining Options

Island Grinds Coffee shop open daily 6:30am- 11:00am; Light lunch fair and longer hours on Wednesday 6:30- 1:30pm.

Tidal restaurant: Open Wednesday – Sunday 5:00- 9:00pm.

Barefoot Bar & Grill: Breakfast from 7am-11am daily, lunch/dinner is 11am-10pm daily.

Island Market: A variety of grab & go refrigerated items and pre-packaged snacks/beverages/fruit. A one-stop shop with a variety of everyday essentials.

See ExpoPass app for more details or visit the above locations for menu details.

Tuesday Exhibitor Hall Lunch

All registered participants and their registered guests are invited to visit the exhibitors and enjoy a complimentary light lunch on Tuesday, March 4th from 11:45 to 1:15 pm in the Exhibit Hall.

Wireless Access

There is basic Wi-Fi in all meeting rooms at Paradise Point Resort.
Wi-Fi network: **Paradise25**
Password: **Paradise25**

ExpoPass App

The **IPM Symposium 2025 App is live!** 1.Search the app store for "ExpoPass" and download the free app in the Apple or Google Play Store. 2. Open the mobile app and click LOGIN.

Having Trouble Logging In? Enter the same email you used to register with and click SEND MAGIC LINK and follow the instructions. Search "**11th International IPM Symposium 2025**" to gain access to the full program and related event details

General Information

Poster Session

The poster session is on Wednesday, March 5th, 4:30-6:30 pm in the Exhibit Hall of the Paradise Point Resort. While all posters will be displayed throughout the symposium, authors are asked to stand by their posters according to their final poster number: 4:30-5:30pm poster #43- 85; 5:30- 6:30pm poster # 1- 42.

Posters can be set up beginning at 10:00 am on Tuesday. Posters must be in place by 4:30 pm on Tuesday. Students entering the poster competition MUST have posters in place by 4:30 pm on Tuesday. Posters can be removed after the poster session ends at 6:30 pm on Wednesday. They must be removed by 9:00 am on Thursday.

Complete abstracts can be found at the website: www.ipmsymposium.org/2025 and in the Expo Pass app. Presentations and posters will be added to the website after the Symposium. If you would like to have your poster added to the 2025 IPM Symposium website, email a pdf of your poster to debby.monfort@uga.edu.

Media

Reporters and other members of the media should register at the Symposium Registration Desk located in the Paradise Foyer at the Conference Center, Paradise Point Resort.

Post-Symposium Evaluation

Keep an eye out for an online evaluation form sent via email following the conclusion of the symposium. Your feedback is valuable and helps us plan future events.

Congratulations to the 11th International IPM Achievement Award recipients!

These recipients will be recognized during the Opening Session on Tuesday, March 3rd

Lifetime Achievement Awards of Excellence

-Peter Mason; Agriculture & Agri-Food, Canada

-Ulrich Kuhlmann; CABI, Germany

International IPM Awards of Excellence

-Rachid Bouharroud; University of Nebraska, (Practitioner)

-Youichi Kobori; Japan International Research Center for Agricultural Sciences

(Practitioner)

-Christopher Hayes; North Carolina University (Graduate Student)

-Tahoe Keys Control Methods Test Team; California
(Team)

-Agriculture & Agri-Food Canada's National Insect Pest & Weed Biocontrol Program (Team)

Lifetime Achievement Awards of Recognition

-Andrea Rilakovic; University of Nebraska (Doctoral Student)

General Information

On-site details: Parking

Guests with vehicles who are staying overnight at the resort will receive a designated parking spot outside their guestroom. Parking for groups, per contract, has been discounted to $18 per car, per night (usually $44), so guests may request a parking pass when they check-in at the front desk.

For visitors or guests who aren't staying overnight at the property the resort provides complimentary parking in either of the two large parking lots by the Lobby and Conference Center. No parking pass or ticket is required to park in either of the two main lots (circled in red below).

Daily Schedule

Monday, March 3rd, 2025

8:00 am – 5:00 pm **Related Meetings**

8:00 am – 1:00 pm **NIFA-USDA Day** *(invitation only)*

9:00 am – 5:30 pm **California Urban IPM Apprenticeship Workshop (advanced registration required)**

1:00 pm – 5:00 pm **Field Trips**

1:00 pm – 5:00 pm **NEERA2104 Regional Meeting** *(invitation only)*

1:00 pm – 5:00 pm **NEERA222 Regional Meeting** *(invitation only)*

1:00 pm – 5:00 pm **WERA1017 Regional Meeting** *(invitation only)*

1:00 pm – 5:00 pm **SERA3 Regional Meeting** *(invitation only)*

Tuesday, March 4th, 2025

7:00 – 8:00 am: Continental Breakfast (Exhibit Hall)

7:00 – 11:30 am: Exhibit Hall Open

8:00 – 10:00 am: (1) Opening Plenary –
Welcome
Dr. Jim Farrar, Keynote
IPM Awards Ceremony

10:00 – 10:15 am: Break

10:15 – 11:45 am Concurrent Sessions
(2) IPM in the Federal Government
(3) Enhancing Accessibility and Inclusivity to Improve IPM Adoption
(4) Management Strategies for Sustainable Crop Production: Whitefly-transmitted Viruses in the United States (1 of 2)
(5) IPM in Housing: Addressing Challenges and Emerging Issues in Affordable Housing (1 of 3)

11:30 – 1:00 pm: Southern IPM Center Advisory Council (invitation only)

11:45 am – 1:15 pm Lunch on your Own
Exhibit Hall Light Lunch
Sponsored by Weyerhaeuser and Naylor Solutions

1:15 – 2:45 pm Concurrent Sessions
(6) Keynote Hot Topic Talk Biocontrol – Shimon Steinberg
Where Biological Control is Foundational to IPM (1 of 2)
(7) A Strategic Plan for The Public IPM Enterprise (1 of 2)

(4) Management Strategies for Sustainable Crop Production: Whitefly-transmitted Viruses in the United States (2 of 2)
(5) IPM in Housing: Addressing Challenges and Emerging Issues in Affordable Housing (2 of 3)
(9) Which Way Forward for Pollinator Protection in the Midst of Anthropogenic Changes?
(10) Practical Applications of Unpiloted Aerial Systems in Ornamental Crop Production (1 of 2)

1:15 pm – 2:45 pm Concurrent Sessions
(8) New Technology Showcase:
LabelSDS
Xcluder Rodent and Pest Defense
Aivision Foods
Automatic Trap
Microshare

2:00 – 4:30 pm: Exhibit Hall Open

2:45 – 3:00 pm: Break

3:00 – 4:30 pm Concurrent Sessions
(6) Where Biological Control is Foundational to IPM (2 of 2)
(7) A Strategic Plan for The Public IPM Enterprise (2 of 2)
(11) Pest Management Strategic Plans and Vegetation Management on Rights-of-Way
(5) IPM in Housing: Addressing Challenges and Emerging Issues in Affordable Housing (3 of 3)
(12) Innovative Rodent Management Tools and Applications for Successful IPM
(13) Exploring Alternate IPM Careers: Meet and Greet (1 of 2)
(10) Practical Applications of Unpiloted Aerial Systems in Ornamental Crop Production (2 of 2)

Wednesday, March 5th, 2025

7:00 – 8:00 am: Continental Breakfast (*Exhibit Hall)*
7:00 – 8:00 am: Mentor-Mentee Breakfast (Students & Early Career Scientists Mentors)
7:00 – 11:30 am: Exhibit Hall Open

8:00 – 9:30 am Concurrent Session
(17) Keynote Hot Topic Talk AI – Siavash Taravati
Data-driven IPM (1 of 2)

(14) IPM for Local Cut Flower Production
(15) Inside the Average American Brain: A Path to Better IPM Communications (1 of 2)
(16) Controlled Environments to Weather Changing Climates (1 of 2)
(18) Bringing IPM to New and Underserved Audiences
(19) Student Voices on Integrated Pest Management
(20) Specialty Crops IPM in the Changing Global Environments (1 of 2)

9:45 – 11:15 am Concurrent Sessions
(17) Data-driven IPM (2 of 2)
(21) How Sysco's Sustainable Agriculture Program Fosters Intersectoral Collaboration for Widespread Adoption of Integrated Pest Management across the Food Supply Chain
(15) Inside the Average American Brain: A Path to Better IPM Communications (2 of 2)
(16) Controlled Environments to Weather Changing Climates (2 of 2)
(22) Enhancing Integrated Pest Management for Rodent Control
(23) IPM's Climate Benefits in Agriculture: What Are They? How Can We Quantify and Generate Incentives to Spur Adoption? (1 of 2)
(20) Specialty Crops IPM in the Changing Global Environments (2 of 2)

11:15 am – 1:15 pm Lunch on your own

1:15 pm – 2:45 pm Concurrent Sessions
(24) Does it Work? Pest Management Efficacy of Creating Habitat for Insect Natural Enemies
(25) Teaching IPM through Innovation in a Changing World
(26) Strategies for Improved Eco-efficiency in Pest Management
(27) Using Research to Design Wildlife Damage Management and Tick IPM Educational Programs
(28) School & Community IPM: How Do We Make this a Success?
(29) Tools and Approaches for Controlling Invasive Pests in Changing Environments
(13) Exploring Alternate IPM Careers: Meet and Greet (2 of 2)

2:00 – 6:30 pm: Exhibit Hall Open

2:45 – 3:00 pm: Break

3:00 – 4:30 pm Concurrent Sessions
(34) Integrated Pest Management as a One Health strategy to Address Human Burden of Vector-Borne Diseases

(30) Harnessing the Power of IPM to Manage Invasive Tree Pests in Southern California
(31) California IPM Roadmap
(32) Status and Control of Spodoptera Frugiperda on Maize in Kolhapur District of Maharashtra, India
The Emergence of Botanical and 25(b) Products in Urban Pest Control: Challenges and Future Integration in IPM
(29) Tools and Approaches for Controlling Invasive Pests in Changing Environments (2 of 2)
(35) Harnessing Biodiversity to Strengthen IPM Programs in Landscapes

4:30 – 6:30 pm: <u>Poster Session</u> & Reception (*Exhibit Hall*)

Thursday, March 6th, 2025

7:00 – 8:00 am Continental Breakfast

8:00 – 3:30 pm **Sysco Supplier Meeting** *(invitation only)*

8:00 – 9:30 am **Concurrent Sessions**
(23) Keynote Hot Topic Talk Climate Change– Patricio Grassini
IPM's Climate Benefits in Agriculture: What Are They? How Can We Quantify and Generate Incentives to Spur Adoption?
(36) IPM at the San Diego Zoo Wildlife Alliance
(37) Insights and Strategies for Effective Audio and Video Communication in Pest Management

9:30 – 9:45 am: Break

9:45 – 11:45 am: **Closing Plenary/Lifetime Achievement Awards/Closing Remarks**

11:45 – 1:00 pm: Lunch on your Own

1:00 - 5:00 pm: Professional Development

- IPM Evaluation Workshop
- Rodent Workshop

IPM-Focused Excursions

Please arrive around 12:30 to sign in. All three field trips will de departing from Paradise Point Port Cochere promptly at 1:00pm on Monday. Transportation is provided to and from Paradise Point. Come prepared: wear comfortable shoes for walking, pack water and snacks, as these will not be provided.

Field Trip: Midway Naval Museum Tour

Monday, March 3 | 12:30-5:00 p.m.
$50 per person |

If you've ever wanted to know how the Navy keeps its sailors safe and healthy on board their world-class ships, this tour is for you! Led by active-duty Navy personnel, this field trip will showcase shipboard IPM practices as we explore the decommissioned carrier, the USS Midway, which has been given new life as a museum of military history and unique event venue. This tour includes some very interesting facts about what can and cannot be done in these unique environments.

Field Trip: UC San Diego IPM Program Tour

Monday, March 3 | 12:30-5:00 p.m.
$50 per person |

Join us for a tour of UCSD facilities that will explore, among other things, their unique IPM program used to maintain rooftop gardens, including the one hosting the art exhibit "Fallen Star." This field trip will also showcase IPM for dorms and other communal spaces on campus, as well as horticultural practices that help control pests and keep spaces inviting for everyone.

Field Trip: Invasive Pests Tour

Monday, March 3 | 12:30-5:00 p.m.
$50 per person |

Each year, dozens of potentially invasive pest species arrive in California, threatening our agriculture, economy, and natural ecosystems. This tour will take you to see the canine detection program from the San Diego County Agricultural Commissioner's office and how the dogs can detect agricultural material in packages and cargo. Next you will visit the Port of San Diego's unique restoration site to learn how they are dealing with sea lavender eradication and other invasive pests. Last stop will be to the Sweetwater Regional Park to see the work the University of California Cooperative Extension and UC Riverside is doing to combat the devastating South American Palm Weevil, which is killing palm trees from Mexico up through Southern California.

Hot Topic Key

= Climate Change = Invasive Species = Vectors/Pathogens = Biocontrol/New Tech = Pesticide Resistance

Professional Development

Lunch will be provided for workshop registrants on the Paradise Terrace at 12:00pm. Workshops begin at 1:00pm

IPM Evaluation Workshop

Thursday, March 6, 2025| 1:00-5:00 p.m.
$75 per person |Bayview Room

This hands-on workshop will provide participants with practical skills to analyze Integrated Pest Management (IPM) adoption using USDA NASS Chemical Use Survey and USGS Pesticide National Synthesis Project (PNSP) datasets. Through step-by-step exercises, attendees will learn methods for extracting, interpreting, and applying data to calculate key risk assessment metrics such as eco-efficiency and total applied toxicity. The focus will be on skill-building and data analysis techniques, ensuring participants gain experience working directly with real-world datasets. Attendees are encouraged to bring their laptops or other devices to fully engage in the interactive exercises.

Managing Rodents in an Ever-Changing Environment Short Course

Thursday, March 6, 2025 | 1:00-5:00 p.m.
$75 per person| Dockside Room

This Short Course will cover basic biology to ensure everyone understands the three species that are most common and what signs to look for when you suspect rats or mice. The session will also cover a variety of management techniques from the latest in exclusion methods, using sensing device data to enhance your success rates with management, using dogs as a biological control method and how the updated rodent risk mitigation rules. FSMA has been in effect now for a few years, however, many food inspectors need to know what to look for when mice and rats can be an issue. This session is designed for public health professionals, registered sanitarians, code enforcement officers and pest management professionals.

Topics to be covered:

- Biology – life cycle and diseases associated with mice and rats.
- Cultural and Sanitation control measures.
- Physical and Mechanical control measures (exclusion and trapping)
- Biological control measure (dog)
- Chemical Control measures – new rodenticide rules and proper placement of bait stations in food handling areas
- Education

Hot Topic Key

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Tuesday, March 4

1. Opening Plenary Session

Sunset Ballroom

8:00 AM

1.1 Welcome and keynote introduction; Janet Hurley, Senior Extension Program Specialist – IPM, Texas A& M University

8:15 AM

1.2 Jim Farrar, Director, University of California Statewide Integrated Pest Management Program

Welcome to California

Current Issues and Future Opportunities in IPM: Integrated Pest Management (IPM) has contributed to significant positive impacts benefiting human-health, the environment, and the economy. The need for IPM will continue as climate change, invasive pests, vector-borne diseases, and pest resistance challenge existing, well-functioning IPM programs. Research in IPM is solving real problems in agriculture, urban areas, and natural systems. Educational IPM programs are supporting increased knowledge and adoption by IPM practitioners, resulting in condition changes benefitting us all. There is greater realization of the need to work collaboratively within IPM and with outside groups addressing public health; climate mitigation and resilience; and sustainability and regenerative certifications. There is also a greater realization of the importance of pairing robust science with an understanding of mental processes when developing effective communication with our multiple audiences, which should lead to greater adoption and support for IPM.

9:10 AM

1.3 Janet Hurley, Senior Extension Program Specialist – IPM, Texas A& M University

Award Presentation
International IPM Lifetime Achievement Award

-Peter Mason: Agriculture and Agrifood, Canada
-Ulrich Kuhlmann; CABI, Germany

International IPM Award of Excellence- Graduate student

-Christopher Hayes; North Carolina University

International IPM Award of Recognition- Doctoral student

-Andrea Rilakovic; University of Nebraska

Hot Topic Key

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International IPM Award of Excellence- Practitioner

-Rachid Bouharroud; INRA Morocco National Institute of Agricultural Research
-Youichi Kobori; Japan International Research Center for Agricultural Sciences

International IPM Award of Excellence- Team

-Tahoe Keys Control Methods Test Team; Hallie Kirkingburg nominated by David Peterson, Board President, Tahoe Keys Property Owners Association

-Agriculture and Agrifood Canada's National Insect Pest and Weed Biocontrol Program nominated by Cezarina Kora, Manager, Agriculture & Agri-Food Canada

Team members:
Dr. Tara Gariepy (London Research and Development Centre, AAFC)
Félix Longpré (London Research and Development Centre, AAFC)
Dr. Paul Abram (Agassiz Research and Development Centre AAFC)
Dr. Michelle Franklin (Agassiz Research and Development Centre AAFC)
Dr. Chandra Moffat (Summerland Research and Development Centre, AAFC)
Dr. David Ensing (Summerland Research and Development Centre, AAFC)
Dr. Rosemarie De Clerk-Floate (Lethbridge Research and Development Centre, AAFC)
Dr. Rob Bourchier (Lethbridge Research and Development Centre, AAFC)
Dr. Kevin Floate and Dr. Hector Carcamo (Lethbridge Research and Development Centre, AAFC)
Dr. Hector Carcamo (Lethbridge Research and Development Centre, AAFC)
Dr. Meghan Vankosky (Saskatoon Research and Development Centre, AAFC)
Dr. Tyler Wist (Saskatoon Research and Development Centre, AAFC)
Dr. Peter Mason (Ottawa Research and Development Centre, AAFC)
Jacob Miall (Ottawa Research and Development Centre, AAFC)
Dr. Roselyne Labbé (Harrow Research and Development Centre, AAFC)
Dr. Justin Renkema (London Research and Development Centre, AAFC)
Dr. Jean-Philippe Parent (Saint-Jean-sur-Richelieu Research and Development Centre, AAFC)
Dr. Annie-Ève Gagnon (Saint-Jean-sur-Richelieu Research and Development Centre, AAFC)
Dr. Christine Noronha (Charlottetown Research and Development Centre, AAFC) Dr. Tim Haye from CABI-Switzerland

Hot Topic Key

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2.IPM in the Federal Government

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: The Federal Integrated Pest Management Coordinating Committee (FIPMCC) provides leadership, management, and coordination on pest management issues across the Federal government. FIPMCC helps to identify priorities for IPM through information exchange among federal and non-federal researchers, educators, innovators, and IPM practitioners. FIPMCC also maintains the National Road Map for Integrated Pest Management. In this session, FIPMCC will gather leaders in IPM from across the Federal government to present on their Agency programs and efforts in IPM research, implementation, and education. FIPMCC includes ten major Federal Departments and Agencies and their IPM programs span agriculture, public lands, urban and structural pest control, public health and safety, and more. Topics of focus in this session will include invasive species control on public lands, biocontrol, and pesticide resistance management with speakers from the U.S. Department of Agriculture and land management agencies in the U.S. Department of the Interior.

10:15 AM

2.1. **Elyssa Arnold**, Regulatory Risk Assessor, U.S. Department of Agriculture, Office of Pest Management Policy, USA

Coordinating IPM Across Federal Agencies:
The Federal Integrated Pest Management Coordinating Committee (FIPMCC) provides leadership, management, and coordination on pest management issues across the Federal government. FIPMCC helps to identify priorities for IPM through information exchange among federal and non-federal researchers, educators, innovators, and IPM practitioners. FIPMCC is led by the USDA Office of Pest Management Policy (OPMP), the USDA lead on pesticide regulation and policy. OPMP represents the voice of growers in the pesticide regulatory process. Part of that responsibility is providing leadership in IPM, promoting IPM strategies that reduce economic, environmental, and public health risks from pests and from the tactics used in pest management through development and adoption of the National IPM Road Map.

10:35 AM

2.2 Joseph Milan, National Biological Control Specialist, U.S. Department of the Interior, Bureau of Land Management, USA

DOI, IPM and Biological Control: The Department of the Interior (DOI) is composed of several bureaus with different missions and focus areas.

Hot Topic Key

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Invasive species are a throughline between those bureaus, although the methods of control vary among bureaus. One common theme is consistent: the most underutilized component of an Integrated Pest Management program is biological control (biocontrol). This presentation will outline the biocontrol focus areas within DOI, identify areas where DOI is strong, challenges we hope to overcome through collaboration, cooperation, and leveraging the resources we have as well as ways where DOI bureaus could improve their biocontrol programs. Special emphasis will be placed on the effective biocontrol agents that are being underutilized and how DOI is looking into the future to find self-propagating control methods for landscape-level infestations throughout the public lands we manage.

10:55 AM

2.3 Jaimin Patel, Principal Plant Pathologist, IR-4 Project, USA

The IR-4 Project: Crafting Integrated Pest Management Strategies for Specialty Crops: Specialty crops are a regular part of diets in every household, but they are often overlooked by major crop protection companies when it comes to product registration. This is primarily because these companies do not perceive a sufficient return on investment.

For over 60 years, the IR-4 Project has been working to provide specialty crop growers access to new pest management tools by generating efficacy, crop safety, and residue data that supports the registration of crop protection products. This success is made possible through IR-4's two core programs: the Food Crops Program and the Environmental (Ornamental) Horticulture Program. Within the Food Crops Program, the Residue and Product Performance research platform focuses primarily on generating residue data in crops at harvest, developing efficacy and crop safety data, and assisting specialty crop growers to access global market through global harmonization of residue limits. The Integrated Solutions (IS) research platform, a part of Food Crops Program, explores the synergistic use of various products, practices and technologies to better equip growers' pest management toolboxes. Aligned with the principles of Integrated Pest Management, the IS platform is designed to generate innovative answers to problems that may not have a single, simple solution. This platform addresses issues such as hard-to-management-pests unacceptable pesticide residue levels in final food products, and pest management in organic crop production. The Environmental Horticulture Program instead develops plant safety and efficacy data for registration of pesticides on ornamental plants.

Author names: Jaimin S. Patel, Alice Axtell, Jerry Barron, The IR-4 Project

11:15 AM

2.4 Q&A

Hot Topic Key

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3. Enhancing Accessibility and Inclusivity to Improve IPM Adoption

Breakout Topic: Communications & Outreach

Location: Dockside

Session Abstract: On April 24, 2024, the Department of Justice's updated regulations for Title II of the Americans with Disabilities Act (ADA) went into effect. These regulations introduce specific requirements to ensure that web content and mobile applications (apps) are accessible to individuals with disabilities. In this session, presenters will talk about how these new accessibility regulations intersect with common online formats and platforms used by integrated pest management (IPM) professionals to disseminate information. We will share how we at the University of California address these accessibility requirements, focusing on aspects such as fonts, audio, visual elements, color choices, and keyboard navigation. We will also discuss our experience in converting and making accessible a website originally created in 1995.

Planning for accessibility from the outset of product development simplifies compliance with current regulations and enhances user interaction and learning. By improving accessibility, we make IPM content better for all users, not just those with disabilities. UC IPM's mission is to educate people about IPM, aiming to make IPM practices easier to learn and adopt. This session explores the importance of designing accessible extension products by sharing our personal "aha" moments to inspire similar realizations among attendees.

Organizers: Tunyalee Martin, Associate Director of Communication, University of California Statewide IPM Program; Cheryl Reynolds, Interactive Learning Developer and Photo Librarian, University of California Statewide Integrated Pest Management Program; Petr Kosina, Content Development Supervisor, University of California Statewide Integrated Pest Management Program

10:15 AM

3.1 Tunyalee Martin, Associate Director for Communication, University of California Statewide Integrated Pest Management Program

Welcome
Accessibility Laws to Know About and Why it's Important:

Focus on online courses and website accessibility, which can be relevant to videos, social media, and even print products.

10:25 AM

3.2 Tunyalee Martin, Petr Kosina, Content Development Supervisor, University of California Statewide Integrated Pest Management Program,

Hot Topic Key

= Climate Change = Invasive Species = Vectors/Pathogens = Biocontrol/New Tech = Pesticide Resistance

Cheryl Reynolds, Interactive Learning Developer and Photo Librarian, University of California Statewide Integrated Pest Management Program

Components of an accessible online course:
Accessible test questions. Accessible instructional strategy. Color contrast. Font sizes. Accessible images. Closed captions. Keyboard navigation. The importance of beta testing.

11:05 AM

3.3 Tunyalee Martin and **Chinh Lam**, IT and Production Supervisor, University of California Statewide Integrated Pest Management Program

Accessibility Issues Encountered with Older Website: Can they be addressed? Considering accessibility when developing a website from scratch.

11:30 AM

3.4- Q &A

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4. Management Strategies for Sustainable Crop Production: Whitefly-Transmitted Viruses in the United States

Breakout Topic: Agriculture (row/field crops)

Location: Garden Room

Session Abstract: Several whitefly-transmitted viruses with the potential to cause severe losses have been discovered in the US in recent years, about which very little information is available. These viruses, which include both DNA and RNA viruses, are frequently found in mixed infections, complicating diagnosis and management. The absence of host resistance to most of these viruses has resulted in a heavy reliance on chemical control, which has proven ineffective under the severe whitefly pressure observed recently. Multi-state collaborative efforts have been initiated to evaluate current management strategies and develop new tools to enhance the existing arsenal.
The proposed session aims to serve as an exhibition and outreach effort to combat whitefly-transmitted viruses in the US, highlighting recent research and extension advancements.

Specific Objectives:

1. To present and discuss recent advances in virology, entomology, agronomy, and horticulture related to emerging and established viruses affecting food and fibre crops in the US. This includes examining the epidemiology of whitefly-transmitted viruses, the application of molecular tools for virus identification and disease management, and strategies for managing whiteflies and the viruses they transmit.

2. To identify and highlight key research areas requiring further investigation to

Hot Topic Key

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address gaps and challenges in the management of whitefly-transmitted viruses and their impact on crops.

Several collaborations are expected to arise from the symposia. They may lead to collaborative research, organization of other symposia, journal article publications, and successful grants. Participants of this group also have formed working groups (https://ecucurbitviruses.org/) to enhance collaboration.

Organizers: Sudeep Bag, Department of Plant Pathology, University of Georgia, USA; William M. Wintermantel, United States Department of Agriculture, Agricultural Research Service, Salinas, California, USA

10:20 AM

4.1 William M. Wintermantel, United States Department of Agriculture, Agricultural Research Service, Salinas, California, USA

Epidemiology of Mixed Virus Infections in cucurbit Production in the Southwestern U.S. and the Importance of Management to Reduce Virus Spread Among cucurbit Production Regions: Since the late 1990s, cucurbit production in the United States (U.S.) has experienced the emergence of five whitefly-transmitted viruses, all associated with abundance of the sweetpotato/silverleaf whitefly *Bemisia tabaci* MEAM1. The impact of individual viruses varies by region and crop, and introduction into one U.S. production region usually results in spread to other regions. Recent surveys in the U.S. southwestern desert melon production region demonstrated that mixed virus infections are common, with cucurbit yellow stunting disorder virus (CYSDV), cucurbit chlorotic yellows virus (CCYV), and recently emerged watermelon chlorotic stunt virus (WmCSV) as the most prevalent. The virus complex has become an important production constraint for southwestern U.S. melon production and has greatly reduced fall production. CYSDV has typically been the dominant virus during the fall melon season, whereas CCYV was more prevalent during the spring season, likely based on prevalence of the latter virus in overwintering crops as weeds. Transmission studies support this, showing that infection timing influences competitive dominance of CCYV or CYSDV in mixed infections of these two viruses in melon. The emergence of the WmCSV in 2023 appears to have altered the dynamics of mixed infections in both melon and watermelon, leading to increased CYSDV prevalence in spring melons and reduced CCYV prevalence. Ongoing studies are examining epidemiology of the whitefly-transmitted virus complex in cucurbit crops. Management of whiteflies and prevention of accidental virus introduction into new regions is critical for cucurbit production in North America, and other regions of the world.

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10:40 AM

4.2 Samuel Discua Duarte, University of Arizona, Yuma Agricultural Center, Yuma AZ; John Palumbo, University of Arizona, Yuma Agricultural Center, Yuma AZ

Management of Whitefly Transmitted Viruses on Melons in the Desert Southwest: In the desert growing regions of the Southwestern U.S, the sweet potato whitefly, *Bemisia tabaci* MEAM1 is one of the primary constraints to economic melon production that growers face. This pest can cause significant reductions in fruit yield and quality through foliage feeding and transmission of plant viruses. Since 2007, this pest has been responsible for vectoring cucurbit yellow stunting disorder virus (CYSDV) and Cucurbit Chlorotic Yellows Virus (CCYV) in fall melons throughout the growing regions of Arizona and southern California. These criniviruses are vectored semi-persistently by whitefly adults and several plants species host the viruses including cucurbits, alfalfa, lettuce, and numerous common weed species. CYSDV/CCYV have the potential to cause significant reductions in fruit yields/quality and have historically required intensive insecticide usage in fall melons. This presentation will focus on research conducted to better understand the virus-vector relationship in melons and pest management tactics developed to reduce virus impact on commercial melon production. The current IPM program for CYSDV/CCYS management in melons has focused minimizing virus transmission by whiteflies through cultural growing practices such as sanitation and crop isolation, and selective chemical control approaches that rely on soil, systemic and timely foliar-applied insecticide applications.

11:00 AM

4.3 Olufemi Alabi,
Department of Plant Pathology and Microbiology,
Texas A&M University,
Weslaco, TX 78596

Identification of Known and Exotic Whitefly-Transmitted Viruses of Major Crops in the Texas Lower Rio Grande Valley: The roughly 1,254-mile lines of the Texas/Mexico border is home to 29 international bridges and crossings that move goods, especially agricultural commodities, northbound into the continental United States. This poses an existential threat of potential inadvertent introduction of exotic and invasive plant pests that may hitchhike plant commodity trucks despite the best efforts of regulatory agencies. This talk will report on the identification of several whitefly-borne viruses in south Texas with a focus on viruses infecting crops such as cucurbits and cotton. The potential interactions between both cropping systems and the implications for IPM-based virus disease management will be discussed.

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11:20 AM

4.4 Sudeep Bag, Department of Plant Pathology, University of Georgia, USA

Identifications and Integrated Pest Management Strategies for Whitefly-Transmitted Viral Diseases in Cucurbits: Whitefly transmits a complex of viruses that has been detrimental for the sustainable production of cucurbit crops in the southern USA. With the lack of host resistance, the current management practices rely on integrated pest management strategies targeting the vectors with chemical control and reflective mulches. Precise and timely diagnosis of the viral pathogens is one of the important steps for the IPM strategies. With the application of high throughput sequencing new emerging viruses has been identified infecting cucurbits, which are well established in the region. Recent study also highlights the significant role of seed transmission in the epidemiology of cucurbit leaf crumple virus (CuLCrV) and the persistence of CuLCrV and cucurbit chlorotic yellows virus (CCYV) in weed reservoirs. These findings provide crucial insights for developing more effective IPM strategies. By focusing on seed health management, minimizing weed populations, and refining vector control measures, this research aims for actionable tools to mitigate the impact of these viral diseases on cucurbit production.

Co-authors: Dalvir Kaur Dhadly[1], Saritha Raman Kavalappara[1], Theodore McAvoy[2], Alvin M. Simmons[3], Rajagopalbabu Srinivasan[4]

Affiliation: [1]Department of Plant Pathology, University of Georgia [2]Department of Horticulture, University of Georgia [3]USDA-ARS, U.S. Vegetable Laboratory, Charleston, SC [4]Department of Entomology, University of Georgia

1:15 PM

4.5 Jason M. Schmidt, Department of Entomology, University of Georgia, USA

Crop specific Effects of IPM Strategies on *Bemisia tabaci* and its Biocontrol Communities*: Bemisia tabaci* Gennadius (Hemiptera: Aleyrodidae) is a pest of global concern. While chemical control is often the default tool for managing *B. tabaci*, insecticides can disrupt natural enemy communities and breed pesticide resistance. Alternatively, enhancing plant defense traits can improve plant protection, but can negatively affect biological control. Therefore, combining targeted, timely insecticide applications with plant defenses may positively and negatively impact insect pest control and the structure of arthropod communities. Here, we assessed the interactive effects two insecticides, leaf trichome presence (glabrous or pubescent) and crop type (cotton or melon) on the abundance of *B. tabaci* and its predators. In addition, to estimate crop specific responses by

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predators to plant traits, crop type and insecticides, we used diagnostic PCR molecular gut content analysis. Preliminary analysis revealed crop specific differences in whitefly responses. In addition, unique predator communities and DNA detection frequencies observed in melon as compared to cotton, plant traits also appear to alter both communities and interactions. Taken together, the initial response to our question posed is yes, the *B. tabaci* system is unique to a cropping system, and both insecticides and plant traits alter pest populations and interactions between other prey and predators under combined management packages.

Co-authors: Albertha J. Parkins[1], Arash Kheirodin[1,2], Jermaine D. Perier[1], Paulo S.G. Cremonez[1,3], David G. Riley[1], Alvin M. Simmons[1,4]

Affiliation: [1]Department of Entomology, University of Georgia, Tifton, GA, USA, [2]Texas A&M University (AgriLife Research and Extension Center), Dallas, TX, USA, [3]Auburn University, Auburn, AL [4]USDA-Agriculture Research Services, U.S. Vegetable Laboratory, Charleston, SC, USA

1:35 PM

4.6 <u>Rajagopalbabu Srinivasan,</u>
Department of Entomology, University of Georgia, USA

Management of Whitefly-Transmitted begomovirus-crinivirus Complex in Squash in Southeastern United States: The sweet potato whitefly (*Bemisia tabaci*) transmits cucurbit leaf crumple virus (CuLCrV), a begomovirus, and two criniviruses *viz*., cucurbit yellow stunting disorder virus (CYSDV) and cucurbit chlorotic yellows virus (CCYV) to squash plants in the Southeastern United States. These viruses often occur as mixed infection leading to development of a severe disease phenotype compared with single infection. Consequently, complete yield loss was recorded in squash fields in Georgia, first in 2016 and 2017, and severe losses continue to accrue annually.

A multi-pronged management approach has been undertaken to manage this important cucurbit virus complex. Host plant resistance against CuLCrV and criniviruses is limiting in cultivated *Cucurbita pepo*, and breeding efforts are underway to develop resistance to CuLCrV, criniviruses, and/or *B. tabaci*, by introgression of genes from wild *Cucurbita* species. Field screening and rigorous greenhouse evaluation using whitefly-mediated virus inoculation have assisted in identifying promising resistant lines. Further, the effectiveness of various cultural tactics and chemical management options are under investigation. Results thus far indicate that a combination of cultural and chemical management options may help mitigate virus incidence and associated yield losses. The tactics and their additive effects will be discussed in length at the symposium.

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1:55 PM

4.7 Theodore McAvoy, Department of Horticulture, University of Georgia, USA

Integrated Pest Management of Whitefly Transmitted Viruses using Tolerant Species, Crops and Cultivars of Cucurbits and Tomatoes: Field trials were conducted in Tifton, Georgia during the fall seasons of 2023 and 2024 to screen cucurbit vegetables and tomato for tolerance to whitefly transmitted viruses. There were differences between cucurbit species, crops and cultivars to whitefly transmitted viruses for virus symptoms and marketable yields. Although resistant cultivars do not exist for whitefly transmitted viruses in cucurbits, breeders are working concurrently to identify resistant genes and incorporate them into breeding lines. In addition, there were differences in commercial tomato cultivars for resistance against TYLCV and marketable fruit yields. Even among resistant tomato cultivars, differences in virus symptoms existed, which is indicative of what growers in the area are experiencing. Selecting crops that are resistant or tolerant to whitefly transmitted viruses are the first step in a successful integrated pest management strategy.

Co-authors: Nirmala Acharya[1], Sudeep Bag[2] and Manish Kumar[2]

[1]Department of Horticulture, University of Georgia[2]Department of Plant Pathology, University of Georgia.

2:15

Panel Discussion facilitated by Sudeep Bag.

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5. IPM in Housing: Addressing Challenges and Emerging Issues in Affordable Housing

Breakout Topic: Urban Structural/Landscape

Location: Sunset Ballroom, Sunset 3

Session Abstract: Multifamily and affordable housing residents suffer from disproportionately high rates of pest infestations and the resulting financial, physical and mental health impacts. While research, new products, and outreach have improved pest management in some of these environments, we have a long way to go. Housing conditions and inequality, pesticide resistance, COVID-19, blaming residents, lack of IPM knowledge, and ineffective treatments all continue to impede effective and safe pest management. The session speakers will present and demonstrate what we have learned works, what can be done better, and what are the remaining issues that impede progress.

Organizer: Susannah Krysko, MS, Cooperative Extension Specialist, IPM in Affordable Housing Cornell University, NY, USA

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10:15 AM

5.1 Dini Miller, PhD, Virginia Tech, USA

Elimination, Not Treatment! Shifting the Pest Control Paradigm in Affordable Housing: Too often government-assisted housing providers hire pest control companies based on the lowest bid, not the lowest qualified bid. They often lack the knowledge of IPM and what protocols are most effective. Dini Miller, PhD. will present her latest data, research, and demonstrations on how assessment-based pest management eliminates pest populations, rather than just "treating".

11:15 AM

5.2 Karen Vail, PhD., University of Tennessee, Knoxville, TN, USA

Pandemic Pests and Low-Income Housing Survey Results: The COVID-19 pandemic may have negatively impacted pest control operations due to limited access and reduced services. As a result, pest treatments were often delayed, pest population levels increased and spread to other apartments within a building. Karen Vail will share survey results revealing how the COVID-19 pandemic impacted pest control services and pest infestations, and where we are currently.

1:15 PM

5.3 Xiaodan Pan, Ph.D., Rutgers University, USA

House Mice Control in Low-Income Housing in New Jersey: This research update from Rutgers University will share the results of three different methods to manage house mice in low-income housing authorities from 3 cities in New Jersey, from 2020 to 2024. The methods tested include a combination of trapping, baiting, and exclusion.

2:00 PM

5.4 Josh Shoemaker, MS, Professional Entomological Services, USA

From Cracks to Control: Enhancing IPM Efficacy by Eliminating Harborage

This presentation will explore the pivotal role of sealing cracks and crevices in the context of IPM for German cockroaches. Evidence strongly supports its preventive value in reducing harborage availability and consequently limiting cockroach population growth. By examining key studies and practical applications, the presentation will highlight how proper sealing of potential entry and harborage points enhances the effectiveness of other control measures and significantly contributes to the long-term reduction of cockroach populations in multi-unit housing. Special attention will be given to common mistakes and best practices in

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sealing techniques and timing to ensure optimal outcomes.

3:00 PM

5.5 Susannah Krysko, MS, Cooperative Extension Specialist, IPM in Affordable Housing Cornell University, NY, USA

Bridging the Gaps: Bringing IPM to Affordable Housing: What can we accomplish through training housing professionals and what are the perceived needs in managing pests in affordable housing. Where are the research gaps, and how can we reach new audiences.

3:45 PM

5.6 Stefano Montesano, Polti, USA; Tommaso Garavaglia, Polti, USA

Using Steam to Treat Bed Bugs Demonstration: Steam is emerging as a very effective, non-chemical treatment for bed bugs. It can be done in-house by affordable housing staff as an option to compliment bed bug treatments. The Polti Cimex Eradicator is a specialized steamer made specifically for bed bugs treatments. Stefano Montesano will demonstrate how steaming works and can be applied by trained housing maintenance staff.

4:05 PM

Q & A Facilitated by Susannah Krysko

6.Where Biological Control is Foundational to IPM

Breakout Topic: Practitioner

Location: Bayview 126

Session Abstract: While IPM in theory involves utilizing many different techniques including biological control, IPM in practice still often relies heavily on pesticide use. This session aims to counter that trend by highlighting instances where biological control has played a central role in effective IPM across many different cropping systems. Innovations and success stories in biological control can be seen around the world, but California in particular represents a region with both a long history of successful biological control, as well as many crops and industries that could benefit from increased adoption of biocontrol practices. In this session, speakers will address ways in which biological control can and has been implemented in a variety of settings in California and in other parts of the world. Academics will present on their research into biological control agents to combat invasive species and promote sustainable crop production, including classical and conservation biological control. Industry professionals will

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showcase ways that augmentative releases of beneficial insects can be used in cannabis, nursery crops, and alongside emerging technologies. This session will provide many examples where biological control has been central to IPM in the past, and a roadmap for effectively implementing biological control in even more settings in the future.

Organizers: Eric Middleton, Area IPM Advisor, UC- ANR; Carol Glenister, Founder, President, IPM Laboratories, NY, USA

1:15 PM

6.1 Shimon Steinberg, Chief Scientific Officer and Head of Research & Development, Biobee, Israel

Keynote Hot Topic Talk Biocontrol

Three Decades of Biologically Based IPM in Greenhouse and Open Field Vegetables in Israel: History, Lessons Learned and A Glance to the Future:
The incentive: initially, a strict demand from the export markets in West Europe and North America for Maximum Residue Level (MRL) of pesticides. Followed by development of resistance to pesticides by key pests: Western Flower Thrips (WFT) and spider mites.

Crops: the two crops which were the first to adopt the system were greenhouse sweet pepper and open field (low tunnels) strawberry. Other crops joined later: watermelon (protected and open field), cucumber, melon, tomato, eggplant.

The biocontrol component: a "package" of natural enemies. Chiefly, the predatory mites *Phytoseiulus persimilis* and *Amblyseius swirskii* for spider mite and whitefly control, respectively, the minute pirate bug *Orius laevigatus* for WFT control and the parasitic wasp *Aphidius colemani* for aphid control. Field establishment is based on the "preventive standing army" approach.

Complementary items from the IPM toolbox: scouting, monitoring, compatibility of pesticides with natural enemies, and decision making.

"Side effects" of the system: secondary pests on the rise. Plant bugs in strawberry, Mirid bugs in sweet pepper, a rare parasitoid of *Orius* eggs. On the other hand, naturally occurring fauna of beneficials join forces with the released natural enemies.

Challenges: lack of effective biocontrol of aphids and leaf-dwelling thrips. Need for efficient application of natural enemies.

The future: implementation of biologically based IPM in open field (row) crops. And: one should bear in mind that the system is always dynamic. Paradigms are prone to change.

2:00 PM

6.2 David Haviland, University of California Cooperative Extension, Kern Co, USA

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Shifts Towards Sustainability Empower Conservation Biocontrol for Spider Mite IPM in California Almonds: Spider mites are a universal pest of almonds in California that can be naturally regulated by a variety of biological control organisms. Historically, phytoseiids served as the predominant predator. More recently, industry-wide shifts away from broad-spectrum pesticide spray programs have resulted in the resurgence of six-spotted thrips as a higher-level predator. We conducted research to develop a sticky card trap system to monitor for six-spotted thrips that was used to generate key information on its biology, phenology, and role in predator-prey relationships. This led to the development of treatment thresholds for spider mites that were based on sampling programs for the natural enemy. This has led to an understanding that if you want to know how many mites there are, count the mites. But if you want to know how many mites there will be in the future, count the thrips. Growers in California who have used this philosophy when making treatment decisions have seen a significant decrease in their need for miticides and have been motivated to decrease the use of broad-spectrum pesticides for other pests, such as navel orangeworm, and increasing their reliance on other technologies, such as mating disruption, that are compatible with their efforts towards conservation biocontrol.

2:22 PM

6.3 Laura Leger, Ph.D. student Entomology, University of California Riverside, USA

A Brief History of California Citrus BioControl: Commercial citrus production in California began in the 1840s. As the industry began to gain traction a few decades later, it met its first major hurdle with the introduction of Cottony Cushion Scale (CCS), *Icerya purchasi*, from Australia. In 1887, C.V. Riley proposed to send an Entomologist to Australia to find potential natural enemies to control CCS. After identifying two potential natural enemies, the Vedalia beetle, *Rodolia cardinalis*, and the parasitic fly, *Cryptochaetum iceryae*, efforts began to rear the insects for release. Within two years after introducing the Vedalia beetle, CCS was successfully controlled. The Vedalia beetle-CCS system continues to be one of the most famous examples of successful biological control, not just in California, but in the United States. Today, the citrus industry still faces pressure from a variety of stressors, including the introduction of novel pest arthropods and diseases. While some of the most pressing biological control efforts are currently focused on Asian Citrus Psyllid, a variety of natural enemies are used to help control citrus pests throughout California. Biological control continues to be a critical component of IPM in California citrus

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and research efforts for the effects of pesticides or other stressors that impact the populations of these essential natural enemies is ongoing.

3:00 PM

6.4 Cody Seals, US Product Manager, Beneficial Insectary

High-Tech IPM: Strawberry Production and Reducing Labor in IPM: Technology is rapidly evolving within agriculture, and biological control agent (BCA) delivery and monitoring is no different. Within strawberry production, dispensing beneficial organisms can contribute to high labor costs, increasing overall production costs. Methods for delivering BCAs to their intended destination and monitoring them once they're applied are expanding with the goal of reducing labor, increasing accuracy, and improving logistics. This presentation will cover technologies available such as; deploying BCAs via drone, updates on ground-based delivery systems, and monitoring technologies that can help producers understand what's in their environment.

3:22 PM

6.5 Saul Alba, Technical Sales California, Biobee, USA

Farmscaping in the Cannabis Crop for Improved Biological Control: Recreational and/or medicinal cannabis is legal in 41 American states. Permitted insecticides and miticides are limited. Most legally compliant cannabis growers in the US rely on augmentative biocontrol as part of their IPM strategy. Conservation biocontrol practices are also rapidly being adopted. This presentation is a summary of the author's experiences, observations and suggestions on farmscaping the indoor, greenhouse and outdoor cannabis crop.

3:44 PM

6.6 Tina Ziaei and Denise Godfrey, Technical Lead Specialist and Sales, Bioline and Olive Hill Greenhouses

Integrating Biological Control Agents (BCAs) into Ornamental Pest Management: The use of Biological Control Agents (BCAs) in ornamental pest management offers a sustainable and environmentally friendly alternative to traditional chemical pesticides. This talk explores the integration of BCAs into pest management strategies for ornamental plants, highlighting their benefits and effectiveness. Key topics include the identification and selection of appropriate BCAs, understanding their mechanisms of action, and implementation. By adopting BCAs, ornamental plant growers can enhance pest control efficacy, promote biodiversity, and contribute to a healthier plant and environment. The second part of this presentation provides practical

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insights into successfully integrating BCAs at an ornamental greenhouse, Olive Hill.

4:06 PM

6.7 Suzanne Wainwright-Evans, Buglady Consulting, USA

Expanding Biocontrol in Ornamentals: Strategies, Challenges, and Success Stories from California: Biological control (biocontrol) is gaining significant traction, with an increasing number of growers integrating it into their pest management strategies. Although biocontrol was first adopted in vegetable and berry production, it has expanded into the ornamental plant sector over the past several decades. California, as a leading producer of ornamental plants, is following this trend. While California growers are eager to adopt more biocontrol solutions, they face challenges related to climate conditions, the availability of biocontrol agents for specific ornamental pests, and understanding the interactions between beneficial organisms and pesticides. Many are turning to growers in other regions of the United States for insights and examples of successful implementation. Despite these challenges, California's ornamental growers are making notable strides, incorporating beneficial insects, predatory mites, and beneficial nematodes into their pest management programs

7. A Strategic Plan for The Public IPM Enterprise

Breakout Topic: Communications & Outreach

Location: Dockside

Session Abstract: Early efforts to create a Strategic Plan for the Public IPM Enterprise in the United States established this vision: "A nation where everyone can access the integrated pest management information, tools and services they need to protect their health, home and livelihood." This session will present steps taken toward that vision and include a robust discussion about the future of IPM. It will begin with a review of the National IPM Infrastructure Survey completed in 2023, which documents the existing IPM infrastructure -- personnel, facilities, and resources -- in 53 states and territories. Next, details of the strategic plan will be presented, based around four goals: Expanded IPM Infrastructure; Enhanced IPM Tools; Comprehensive IPM Information Resources; and Increased IPM Awareness. The presentation and discussion will highlight ways to contribute to the development of IPM, concluding with action items for attendees

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to advance IPM to benefit the American public.

Organizer: Roger Magarey, Center for IPM, Principal Research Scholar, North Carolina State University, Co-director Southern IPM Center, USA

1:15 PM

7.1 Roger Magarey, Center for IPM, Principal Research Scholar, North Carolina State University, Co-director Southern IPM Center, USA

A Strategic Plan for the Public IPM Enterprise: Integrated Pest Management has been instrumental in protecting American agriculture, communities and landscapes from pests and pesticides for five decades, but the distributed nature of public IPM programs has made efficient coordination and strategic planning difficult. This effort attempts to overcome those barriers, unite our disparate entities into a Public IPM Enterprise, and create a roadmap to a future "where everyone can access the integrated pest management information, tools and services they need to protect their health, home and livelihood."

1:20 PM

7.2 Daren Mueller, Professor and Extension Plant Pathologist, Iowa State University, Co-director North Central IPM Center, USA

The IPM Infrastructure survey: The effort to create a strategic plan for the Public IPM Enterprise began in 2022 and included a baseline survey and SWOT analysis to document the existing IPM infrastructure in 53 states and territories. The Public IPM Enterprise boasts a network of over 1,000 specialists. The organization faces challenges such as a shortage of support staff in communications and evaluation, and flat-level funding that exacerbates these issues. But there are also opportunities to redefine the role of IPM specialists by integrating basic IPM training into new disciplines and advocating for increased support from university administrations, commodity groups and state legislatures. The enterprise is threatened, however, by the rapid retirement or departure of IPM specialists, which weakens internal and external relationships due to sparse staffing.

2:15 PM

Facilitated Discussion

3:05 PM

7.3 James Jay Farrar, Director Statewide IPM Program, University of California Agriculture and Natural Resources, USA

Goal 1: Provide the Public-Benefit Research and Extension Education to Protect People from Pests and Pesticides: Integrated Pest Management plays a critical role in safeguarding public health, protecting the environment and ensuring

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agricultural sustainability and urban pest control. To maximize the benefits of IPM, continued investment in research and education is essential. This includes validating industry-created lower-risk products, developing best management practices for fully integrated IPM programs, reducing barriers to adoption, and documenting economic and environmental benefits. Research must focus on emerging challenges such as shifts in pest ranges, antimicrobial resistance and invasive species. Collaboration between researchers, policymakers and industry stakeholders is vital to ensuring practical implementation and adoption of sustainable IPM strategies.

3:20 PM

7.4 Roger Magarey, Center for IPM, Principal Research Scholar, North Carolina State University, Co-director Southern IPM Center, USA

Goal 2: Gather and Provide Useful and Timely Information to Agencies, Stakeholders, and Decision Makers: Accurate and timely IPM information is critical for regulatory decisions, policy development and stakeholder education. Establishing regional networks to provide expert commentary, updating Pest Management Strategic Plans and engaging with state and federal policymakers will ensure IPM remains a priority in pest management and regulatory decisions. Strengthening partnerships with key organizations and ensuring IPM representation in broader environmental and health initiatives, such as One Health, will further solidify IPM's role in public welfare.

3:35 PM

7.5 Joseph LaForest, Associate Director Invasive Species and Ecosystem Health (Bugwood), Co-Director Southern IPM Center, University of Georgia, USA

Goal 3: Enhance Engagement and Collaboration: Stronger internal and external collaborations are necessary to maximize the impact of IPM programs. Expanding the Connect database will improve networking and collaboration among IPM professionals, facilitating better coordination within the Crop Protection and Pest Management Program. Additionally, strategic partnerships with allied programs such as SARE, IR-4 and NPDN will enhance IPM outreach and implementation. Strengthening communication pathways between research, extension and industry professionals will ensure IPM remains responsive to evolving challenges.

Goal 4: Leverage and Share Resources: Developing, cataloging and promoting publicly available IPM resources will strengthen the reach and accessibility of pest management tools. Support for multi-state programs such as MyIPM, AgPest Monitor and the Crop Protection Network will expand resource availability. Investing in IT infrastructure to support data-sharing, collaborative research and

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enterprise-wide evaluation will promote research efficiencies and facilitate economic analyses to document the value of public IPM investments.

3:50 PM

7.6 Steve Elliott, Communication Coordinator, Western IPM Center, University of California Davis, USA

Goal 5: Increase IPM Awareness IPM has been described as "the best-kept secret in American science." Raising awareness of IPM, and its practices, value, and scope, will help the Public IPM Enterprise protect people, the environment and economy and is critical to achieving the goals spelled out above. To raise IPM awareness, we must increase coordination, highlight impacts and target resources and messages to the right audience in the right format. Key elements of Goal 5 include: communicating the value and scope of IPM to the public and key audiences; creating a repository of communication resources for IPM programs and professionals; and coordinating annual outreach campaigns around a single IPM topic, such as school IPM or IPM economic benefits.

Goal 6: Expand IPM Beyond the Traditional Pest-Focused Disciplines The future of IPM will be built through multidisciplinary collaboration beyond biologically focused sciences. Engaging experts in economics, sociology, marketing, engineering, artificial intelligence, remote sensing and automation will enhance IPM effectiveness and adoption. AI-driven pest monitoring tools and automation can revolutionize pest management, making it more precise, efficient and economical. Encouraging interdisciplinary research and fostering collaboration among traditionally separate scientific disciplines will lead to innovative solutions for pest management challenges.

4:05 PM

Panel Discussion facilitated by Roger Magarey.

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8. New Technology Showcase

Breakout Topic: Public Health

Location: Sunset 1 &2

Companies will demonstrate new products and services with eight-minute presentations during the technical program.

Organizer: Ben Hopper, Sr. Director of Account Management, Naylor Association Solutions

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1:15 PM

8.1 Chip Hughes, President/CEO, LabelSDS.com

How to Simplify and Automate the Management and Communication of your Pesticide Labels and Safety Data Sheets: New technology allows you to easily manage and communicate your company's pesticide labels and safety data sheets.

LabelSDS.com is a pesticide label and safety data sheet management program that keeps all your company's labels and SDSs up to date, notifies you of the updates and provides a seamless platform to communicate this information to your team and customers.

1:25 PM

8.2 Zhongli Pan, Founder/CEO Aivision Foods

SmartProbe for Smart and Data-driven IPM with Reduced Cost: AIVision Food introduces a new SmartProbe system and presents the demonstrated results of the superior effectiveness in early detection of insect activity in both products and environment. The new technology replaces human scouting and visual inspection and achieves remote monitoring, AI insect identification and counting, automatic notification and report generation, which reduces labor costs, product loss and chemical uses.

AIVision Food provides a cutting-edge solution to revolutionize pest and product quality management through advanced SmartProbe technology. With a mobile app, probes, and AI algorithm, the SmartProbe enables early detection and monitoring of insect pests and moisture changes and empower management to make data-driven decisions and take timely action through automatic notifications and reports.

1:35 PM

8.3 Dave Colbert, Xcluder Rodent and Pest Defense

Top Exclusion Technologies: How to Effectively Safeguard a Facility Against Rodents and Other Pests: This session will identify common rodent access points and how to safeguard them. It will showcase the latest exclusion technologies and address key misconceptions that leave facilities vulnerable to infestation.

Xcluder is the world leader in pest exclusion, offering a range of product solutions that provide advanced protection from rodents and other pests. Xcluder Fill Fabric is a blend of stainless steel and poly-fiber that rodents cannot gnaw through, and Xcluder's Rodent-Proof Door Sweeps come in various designs to protect personnel doors, garage doors, roll-up doors and loading docks.

1:45 PM

8.4 Blair Calder, Founder and President, Automatic Trap

Hot Topic Key

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Non-toxic Effective Wildlife Control Tools from Goodnature and ATC: No rodenticides? No problem! Learn about California compliant / non-toxic effective wildlife control tools from Goodnature and ATC for rats, mice and squirrels.

1:55 PM

8.5 Matt Medici, Senior Client Services Manager, Microshare

EverSmart Rodent: Smart Surveillance for Unwanted Guests

2:05 PM

8.6 Q & A

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9. Which Way Forward for Pollinator Protection in the Midst of Anthropogenic Changes?

Breakout Topic: Cross-Disciplinary

Location: Sunset 4

Session Abstract: Pollinator protection has been a key concern for integrated pest and pollinator management (IPPM) and a key concern around the managed pollinator protection plans (MP3s) on how to mitigate insecticide and fungicide treatments to reduce impacts to pollinating insects. The objective of this symposium is to bring together specialists from academia, industry, regulatory agencies, Extension, and to discuss the implications of anthropogenic changes (e.g., climate change, landscape and habitat fragmentation, pesticide exposure, etc.) on pollinator health, diversity, and abundance. The symposium will be highly interdisciplinary and will include early and mature career professionals, Extension and regulatory participants, participants from both Canada and the U.S. and include federal, state and tribal participants. We anticipate preparing a news article about the outcomes of the symposium, as well as the development of new collaborations between all the participants.

Organizers: Juliana Rangel, Researcher, Texas A&M University, USA; Dr. Jennifer Tsuruda, Assistant Professor, University of Tennessee, Knoxville, USA

1:15 PM

9.1 Vanessa Corby-Harris, Research Physiologist (Insects),Carl Hayden Bee Research Center, USDA-ARS, Tucson, Arizona, USA

Can Better Diets Improve Honey Bee Pesticide Resilience?: Honey bee colonies provide more than $15 billion in pollination services to U.S. agriculture each year. Unfortunately, bee health is

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compromised by necessary features of modern agriculture, like pesticides. "Pollinator safe" pesticides reduce pollinator mortality, but even the safest pesticides can have off target, sublethal effects. How can we further support hive health in the presence of pesticides that are necessary for minimizing crop loss? Improved honeybee nutrition is a compromise that benefits both beekeepers and growers because it increases hive resilience without completely restricting growers' pest control options. Here, I give one example of how better bee diets might improve colony resilience in the presence of an insect growth regulator with off-target effects on bee health. I will conclude by discussing the challenges and our progress with this research.

1:33 PM

9.2 Kelsey Graham, Research Entomologist, USDA Agricultural Research Service, Pollinating Insects Research Unit, USA

Pollinator Plantings in Agricultural Fields: Oasis or Pesticide Trap?: Wildflower plantings adjacent to agricultural fields provide diverse floral resources and nesting sites for wild bees. However, their proximity to pest control activities in the crop may result in pesticide exposure if pesticides drift into pollinator plantings. To quantify pesticide residues in pollinator plantings, we sampled flowers and soil from pollinator plantings and compared them to samples from unenhanced field margins and crop row middles. Additionally, we placed bumble bee colonies (Bombus impatiens) in field margins of crop fields with and without pollinator plantings and measured residues in bee-collected pollen. Samples taken from pollinator plantings had similar pesticide residue profiles compared to those taken from within the crop field, suggesting that pollinator plantings do not reduce pesticide risks to wild bees. Results have implications for wild bee conservation and suggest further adoption of IPM strategies is necessary to protect wild bees on farms.

1:51 PM

9.3 Judy Wu-Smart, Associate Professor and Extension Specialist, University of Nebraska, Lincoln, USA

Investigating the Impact of Improper Treated Seed Disposal on Pollinators: Pesticide Regulation Challenges and Lessons from a Nebraska Case Study: Persistent losses of bee colonies across multiple University of Nebraska-Lincoln research apiaries, coupled with investigations into the broader decline of bee populations, uncovered a novel practice: the disposal of surplus, outdated, and pesticide-treated crop seeds through ethanol production in a rural Nebraska village. This practice led to widespread systemic pesticide pollution, as chemical residues leached from waste byproducts,

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creating a unique opportunity to examine the environmental fate, persistence, and exposure risks associated with such contamination. This event affected surrounding communities and wildlife, including pollinators. This presentation highlights the research and regulatory challenges that arose from this pesticide pollution incident, which ultimately contributed to changes in pesticide policy across the United States.

2:09 PM

9.4 Miles Dakin* and Dr. Lora Morandin (*presenting), Co-Director of Agricultural Programs, Pollinator Partnership, USA

Farmers as Conservation Partners in the Biodiversity Loss Emergency: Pollinator declines are being exacerbated by a loss of quality habitat due to increasing human land alteration. Agricultural production is just one potential threat to pollinators, but like other land uses, there are opportunities to combine human use with conservation. In the case of agriculture, there is the added potential benefit that pollinator and biodiversity conservation actions can be beneficial for lowering inputs, increasing yields, and producing food more sustainably. However, many barriers stand in the way of widespread adoption of pollinator and biodiversity conservation in agroecosystems, including low prioritization of these practices, lack of financial incentive to compensate for the high implementation costs, low confidence in their conservation and production benefits, and limited technical assistance and knowledge. While these barriers are complex, numerous, and interact, farmers can, and often want, to be conservation champions in the pollinator and biodiversity crisis. Pollinator Partnership has over 2 decades of experience working with farmers and has created numerous programs and materials that address many of these challenging barriers. From a certification program that helps growers receive a premium on products, accessible and easy to read guides that meet farmers where they're at, trained staff specialists that visit growers on their property to plan and implement habitat, to incentive programs that cover plant material and labor costs, these programs have adapted and developed over time, and are making meaningful connections and change on the ground. By lowering the barrier to entry for the early adopting farmers, Pollinator Partnership is creating outspoken advocates that are enthusiastically encouraging their neighbors and fellow farmers to follow suit.

2:27 PM

9.5 Jennifer Tsuruda, Assistant Professor and Extension Specialist, University of Tennessee, Knoxville, USA

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Honeybee IPM in the Winter – Parasites, Climate, and Stakeholders: The status of capped brood in honey bee colonies during winter is critical information for beekeepers when choosing an appropriate treatment for controlling parasitic *Varroa destructor* mites. Predictable periods without brood are sometimes assumed for the winter, but may not be the case, especially in regions with mild winters. To help beekeepers with management decisions during winter and early spring, land-grant universities, USDA-ARS labs, a statewide Extension system, and beekeepers are cooperatively monitoring colonies for brood production during the winter. Additionally, estimations of adult bee populations, management (feeding and *Varroa* treatment), and survival are also recorded. Maps are created and posted in a timely manner to allow beekeepers to make appropriate, data-based action for effective mite treatments. Future directions include comparing monitoring year, queen source stock, management, and surveying beekeepers.

Co-organizers: Juliana Rangel (Texas A&M University) and Jennifer Tsuruda (University of Tennessee)

10. Practical Applications of Unpiloted Aerial Systems in Ornamental Crop Production

Break Topic: Horticulture/Specialty Crops

Location: Sunset 5

Session Abstract: University of Maryland Extension specialists have begun utilizing Unpiloted Aerial Vehicles (UAV), or drones in several IPM strategies for ornamental crop systems to manage production efficiencies. Our IPM team has shown that UAV's have many potential uses for managing pests, including agrochemical applications, and for identifying other production problems including nutrient deficiencies and water stress. Our research shows increased efficiency with drone agrochemical application, decreasing time, lowering application rates and costs, and increasing safety for humans. In some cases, identification of nutrient deficiencies and water stress is possible with the correct imaging equipment and processing software. Furthermore, the use of vegetation indices, such as NDVI and NDRE, has proven effective in enhancing the detection and quantification of these stressors, enabling more precise and timely management decisions.

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Our IPM team is made up of an experienced drone pilot, and University of Maryland Specialists in agricultural engineering, pathology, and horticulture. Our expert drone pilot will cover the newest drone equipment available and regulations for application of agrochemical materials in ornamental and food production systems. Our pathologist will discuss the use of drones to apply low risk insecticides, beneficial organisms and fungicides to major pest problems in these crop production systems. Our horticulture specialist will present on the use of drones to detect water and nutrient stress using imaging and software and our engineer will discuss the application of Pix4Dfields software for multispectral data processing and estimation of different vegetation indices for water and nutrient stress.

Organizers: Dave Clement, Extension Specialist, Commercial Horticulture, Home and Garden Information Center, University of Maryland Extension, USA

1:15 PM

10.1 Kirk Floyd, Owner, Kdrone Services, Damascus, MD, USA

Current UAV Technology and Regulations for the Ornamental Industry: Mr. Floyd will cover the newest UAV equipment and review the current rules and regulations for ornamental and food production systems.

2:00 PM

10.2 David L. Clement, Ph.D., Extension Specialist, Commercial Horticulture, University of Maryland Extension Home and Garden Information Center, USA

UAV Applications of Low-Risk Fungicides for Ornamental Disease Management: Dr. Clement will discuss UAV's strategies for the application of low risk fungicides in the ornamental industry.

3:00 PM

10.3 Andrew G. Ristvey, Ph.D., Extension Specialist, Commercial Horticulture University of Maryland Extension Wye Research and Education Center, USA

UAV Imaging for Analyzing Plant Stress: Dr. Ristvey will offer a conceptual framework for the use of drone imaging and software to detect nutrient and water stress in ornamental crops, along providing details of his studies showing what worked well, what did not, and why.

3:45 PM

10.4 Hemendra Kumar, Ph.D., Extension Specialist, Commercial Horticulture, University of Maryland Extension Upper Marlborough Research and Education Center, USA

Use of Imaging Software for Decision Making with High Resolution UAV Data: Dr. Kumar will cover the step-by-step process on multispectral data analyses using Pix4Dfields. Pix4Dfields is a

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comprehensive agricultural mapping and analytics software designed for precision applications. It allows users to process and analyze aerial imagery captured by drones to generate high-resolution maps and actionable insights. Dr. Kumar will cover how to estimate different vegetation indices which helps in assessing crop health, vigor, and stress.

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11. Pest Management Strategic Plans and Vegetation Management on Rights-of-Way

Breakout Topic: Agriculture (Row/Field Crops)

Location: Garden Room

Session Abstract: This presentation addresses the role of Pest Management Strategic Plans (PMSPs) and their intersection with managing energy and transportation rights-of-way (ROW) to reduce noxious and invasive species, support pollinator populations, and ensure worker safety. The goal is to explore how PMSPs are created and to demonstrate their role in effective pest control practices, enhance pollinator habitats, and balance ecological and safety concerns.

During the presentation, we will provide insights into the creation and importance of a PMSP and the unique challenges of creating one for ROW managers. Following the presentation, a panel discussion will address audience questions and discuss the challenges of pest management on non-agricultural landscapes. Anticipated outcomes include audience understanding of PMSPs, recognition of the variety of landscapes management, and potential for future collaborations and proposals to advance PMSP use in ROW management and conservation efforts.

Organizer: Caroline Hernandez, Assistant Director, Sustainable Landscapes, University of Illinois, Chicago, USA

3:00 PM

11.1 Caroline Hernandez, Assistant Director, Sustainable Landscapes, University of Illinois, Chicago, USA

Introduction

3:05 PM

11.2 Elyssa Arnold, Regulatory Risk Assessor, USDA Office of Pest Management Policy, USA

The Importance of Pest Management Strategic Plans in the Pesticide Regulatory Process: Pest Management Strategic Plans (PMSPs) were first developed in 1998 in response to the Food Quality Protection Act (FQPA), which transformed the U.S. pesticide regulatory process. PMSPs address pest management needs and priorities for specific crops or other pesticide use sites in a particular geographic area. This presentation will

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explain how the U.S. Environmental Protection Agency moves through the pesticide regulatory process under FQPA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and why PMSPs are a critical resource for understanding the importance of each chemical, how the pesticides are used, and what alternatives are available.

3:25 PM

11.3 Lynnae Jess, Co-director, working group liaison, North Central IPM Center, Michigan State University, USA

Bridging Gaps in Pest Management: How PMSPs Shape Industry Priorities and Support IPM Programs: Pest Management Strategic Plans (PMSPs) play a pivotal role in the realm of integrated pest management (IPM) by facilitating the collection of crucial data from growers, commodity associations, specialists, processors, consultants, and other agencies. Importantly, PMSPs inform regulatory agencies about the active ingredients required to safeguard crop production and introduce potential solutions to combat resistance issues. This presentation will explain how by soliciting input from these groups, the North Central Integrated Pest Management Center helps to create comprehensive representation of the industry's priorities, research needs, regulatory considerations, and educational requirements through comprehensive PMSPs.

3:45 PM

11.4 Caroline Hernandez, Assistant Director, Sustainable Landscapes, University of Illinois, Chicago, USA

Revitalizing the Rights-of-Way PMSP: A Collaborative Approach to Landscape-Scale Habitat and Vegetation Management: The Rights-of-Way as Habitat Working Group is a collaborative focused on integrating habitat conservation into the management of energy and transportation rights-of-way (ROW) across the United States and Canada. IVM is a key approach used by energy and transportation agencies to balance operational goals with environmental stewardship, strategically managing vegetation through a combination of methods to maintain safe, reliable infrastructure while enhancing ecosystems and protecting native species. The Rights-of-Way PMSP had not been updated since 2003; this presentation will explain how the Rights-of-Way as Habitat Working Group was leveraged to update the ROW PMSP and create a resource for vegetation managers and policy makers to connect on landscape scale vegetation and habitat management.

4:05 pm

11.5 Caroline Hernandez: Facilitated discussion/Q&A

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12. Innovative Rodent Management Tools and Applications for Successful IPM

Breakout Topic: Public Health

Location: Sunset 1 & 2

Organizer: Sylvia Kenmuir, BCE, MSc., Senior Technical Services Representative-West, BASF, USA

3:00 PM

12.1 Cameron Rains, Technical Sales Manager, SenesTech Inc., Phoenix, Arizona, USA

Incorporating Birth Control into Integrated Pest Management: Holistically Restrict Rodent Reproduction: The future of pest management requires innovative solutions to tackle persistent rodent infestations. Traditional methods, which predominately rely on rodenticides and traps, may offer only short-term results but come with significant risks to non-target species, humans and the environment. Integrating rodent birth control into IPM provides a more sustainable and effective approach. This presentation will explore the essential role of rodent birth control in modern IPM strategies. Our research demonstrates that this approach can dramatically reduce rodent populations within months, offering a long-term solution to infestations. Palatability tests confirm that rodents readily accept these products, ensuring the successful delivery of the active ingredients to both male and female rodents. Rodent birth control is distinguished by its holistic approach, targeting reproduction to address the root cause of infestations. This method is safe for people, pets, wildlife, and the environment when used as directed. it aligns with the global shift towards more sustainable pest management practices, reducing the need for traditional toxic methods. Join use to discover how incorporating rodent birth control into IPM is shaping the landscape of rodent control, offering a comprehensive and safe solution that supports long-term pest management goals.

3:30 PM

12.2 Patrick Lynch, Chief Commercial Officer, Bell Laboratories, Inc., USA

IPM Demands Rodent Monitoring Technology: Bell Laboratories will conduct a half hour-long educational session on all aspects of rodent monitoring technology. IPM practices necessitate the incorporation of sensing rodent devices. Identification, inspection, and knowledge of pests (rodents) is the hallmark of any successful IPM program. The amount of time spent at an account and knowing where pests are traveling are the most critical aspects when conducting inspection and identification in pest control. Rodent sensing devices automatically track and report when and where rodents are traveling. This information is required for monitoring

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pest populations, establishing thresholds as well as properly evaluating program results. Impending regulatory challenges and legislation limiting rodenticide usage only amplify the need to automatically gather as many rodent activity data points as possible.

The three most common rodent control devices in use today are bait stations, multiple catch mouse traps, and rat snap traps. Utilizing technology in these devices provides the pest management professional with never-before-available automated data as to when rodent pressure is occurring. Smart snap traps and smart multiple catch traps report the time of capture, which can be critical to evaluating when and where pest pressure is occurring. Bait station technology delivers data on the whereabouts of rodents and the population size. The efficiency of these products used together provides the time necessary to conduct more thorough inspections.

4:00 PM

12.3 Sylvia Kenmuir, BCE, MSc., Senior Technical Services Representative- West , BASF, USA

Adapting Rodent Management Programs to Evolving Regulations: Rodent management continues to progress, driven by the need to address evolving regulatory challenges and adapt to new modern practices. While rodenticides remain a central focus, with an increasing demand for scientific research to guide their responsible use, integrated rodent management strategies are becoming increasingly vital. Preserving the effectiveness of rodenticides requires a multifaceted approach that incorporates exclusion methods to prevent access, continuous monitoring to detect infestations early, and the use of other complementary tools and techniques. Success in urban IPM also hinges on proper communication and education, engaging consumers as critical partners. By diversifying strategies, we can achieve sustainable rodent control while preserving rodenticides for when they are most needed.

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13. Exploring Alternate IPM Careers Meet and Greet

Breakout Topic: Cross-Disciplinary

Location: Sunset 4, Sunset 5

Session Abstract: Are you exploring your career options or interested in changing careers? If so, this session is for you! Join a group of seasoned IPM professionals representing private industry, universities, and non-governmental organizations to explore the variety of career paths available within the world of Integrated Pest Management. Session activities will help you meet influential people and learn about interesting and fulfilling careers that you may not have considered. For

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instance, have you always wanted to write educational materials, develop new IPM products, improve the efficacy of IPM programs, or help people understand how to mitigate risks while applying pesticides? There are so many possible career paths for IPM practitioners and researchers working in IPM-related disciplines. So don't miss this informal meet-and-greet session – you might just discover the career of your dreams!

3:00 PM (Tuesday, March 4th)
Session I

13.1 Shannah Whithaus, (session organizer) Senior Editor, Pesticide Safety Education, University of California Agriculture and Natural Resources, USA

1:15 (Wednesday, March 5th)
Session II

13.2 Shannah Whithaus, (session organizer) Senior Editor, Pesticide Safety Education, University of California Agriculture and Natural Resources, USA

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Wednesday, March 5th

14. IPM for Local Cut Flower Production

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: Small to medium scale field/greenhouse grown cut flower operations are increasing in number throughout the Northeast. While some growers are using cut flowers as a diversification crop, others are coming from a wide variety of backgrounds, sometimes with little crop production knowledge. The plethora of species and cultivars that are grown, the number of insect, disease and weed pests that can affect them, and the complexity of choosing appropriate pest management strategies make it difficult for growers to successfully grow beautiful crops consistently. In many states, the number of growers is increasing faster than the number of faculty and Extension specialists to help them, so there is a need for IPM information and materials designed for use by cut flower growers. A combination of grower and research/extension presenters will set the stage for a discussion of what pest management resources specific to small scale cut flower production are needed and where they might be currently available for broader use.

8:00 AM

14.1 Elizabeth M Lamb, Coordinator of Ornamental IPM, New York State Integrated Pest Management Program, Cornell University, USA

State of the Art: Assessing the Level of IPM Knowledge of Local Cut Flower Growers, A Beginning in New York State: The cut flower extension program in New York State is less than 5 years old, although the industry has been growing for longer than that. Through a variety of programs with cut flower growers, it seems clear that accurate and effective pest management information is spotty at best and poorly supported by science at worst. This presentation will cover what we have tried so far to reach the audience and what we are planning for the future for IPM programming for local small scale cut flower growers.

Organizer: Elizabeth M Lamb, Coordinator of Ornamental IPM, New York State Integrated Pest Management Program, Cornell University, USA

8:25 AM

14.2. Valerie Mellano, Professor and Chair, Emeritus, Plant Science Department, Don B. Huntley College of Agriculture, Cal Poly Pomona,

Pest Management Challenges in Ornamental Production in Southern California: Nursery and cut flower production in Southern California contributes significantly to the agricultural industry in the south coastal areas and

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more recently in some of the inland valley areas. San Diego County is the leading nursery county in California, and nursery and cut flower production make up approximately 70% of the agricultural production dollars for the county. The climate is favorable to allow for year-round outdoor production of nursery, floriculture and greens production, although production in greenhouses and other structures also exists. Because of the favorable climate and year-round production, pest management is difficult. Many of the host plants for insect pests are also grown as landscape plants and are available to support pest populations over a large part of the county. In addition, proximity to the border and imported plant material provides an opportunity for pest importation also. New pest presence in continuous, and requires diligence in monitoring, collaboration pest management professionals, and work with researchers to stay ahead of the issues. In addition, pesticide regulations are continuously increasing, and there are fewer options available to be used in a management program.

8:45 AM

14.3 Gary A Chastagner, Ph.D., Professor of Plant Pathology, Washington State University, Research and Extension Center, USA

Progress and challenges relating to the management of diseases on ornamental geophytes: The Pacific Northwest (PNW) has a long history of producing ornamental geophytes, such as tulip, lily, and peony planting stock and cut flowers. In addition to a few legacy large farms that specialize in the production of specific geophytes, there has been an increase in the number of smaller specialty cut flower growers that are producing a diversity of cut flower crops, including ornamental geophytes. There are a number of fungal, virus, bacterial, and nematode diseases that can severely impact the production of ornamental geophytes. For the past 46 years, I have had the honor to lead the ornamental disease management research and extension program at Washington State University's Research and Extension Center in Puyallup, WA. This includes extensive work with tulip, lily, and daffodil growers in the PNW and peony growers in the PNW and Alaska. This presentation will provide an overview of some of the progress we have made in helping growers improve their disease management programs and some of the challenges facing the industry, including the long-term sustainability of research and extension programs to assist growers.

9:05 AM

14.4 Discussion with presenters and audience on how to make progress toward providing cut flower growers with appropriate level IPM information (questions provided to speakers in advance, led by Lamb) 20 mins.

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15. Inside the Average American Brain: A Path to Better IPM Communications

Breakout Topic: Communications & Outreach

Location: Dockside

Session Abstract: The minds of people in your audience are not blank slates waiting for your message to arrive. In fact, human minds are more like a cluttered swamp of opinions and ideas (mental models), full of contradictions and inconsistency along with clarity and certainty. To succeed with your communications, it helps to know the dominant mental models in the minds of your audience. Then, you can more effectively navigate through the 'cluttered swamps' so people keep on listening and don't shut down, in the hopes that your message will 'stick.' This is strategic framing in action.

In this two-part session, we will add capacity for communicators to contribute to the public understanding of IPM and sustainable farming by equipping them with tools of strategic framing. In Session 1, we create an understanding of framing; share the dominant mental models of farming held by the U.S. public; and explore what doesn't work: common approaches to IPM/farm communications that go flat. In Session 2, we present six general strategies for framing communications on IPM and farming; we apply the six strategies to participant samples and other business/academic/NGO messages; and we look at the unique aspects of business communications, and science/academic communications.

The sessions will be interactive and include small group work. Participants are encouraged to read and view resources that will be provided ahead of time; and are encouraged to bring a sample(s) of their own communications to the sessions to work on. The two sessions are based on seven years of social science research conducted by FrameWorks Institute of Washington D.C.

Organizer: Michael Rozyne, Co- founder; Red Tomato/Farming & Food Narrative Project, USA; Kelsey Gosch, Development and Project Coordinator, Red Tomato/Farming & Food Narrative Project, USA

8:00 AM

15.1 Michael Rozyne, Red Tomato/Farming & Food Narrative Project, USA, **Kelsey Gosch**, Red Tomato/Farming & Food Narrative Project, **Jim Farrar,** Ph.D., Director, University of California Statewide IPM Program

Inside the Average American Brain: A Path to Better IPM Communications, Session I:

- Personal introductions, agenda review

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- Presenters' story: how we learned to explain IPM without mentioning it
- What's Framing, and why it matters
- Frameworks Institute and the social science behind our work
- Mental models of farming held by the U.S. public
- Small group work on identifying mental models activated in participant communications, and other examples
- What doesn't work: common approaches to IPM/farm communications that go flat

9:45 AM

15.2 Michael Rozyne, Red Tomato/Farming & Food Narrative Project, USA, **Kelsey Gosch**, Red Tomato/Farming & Food Narrative Project, USA, **Jim Farrar,** Ph.D., University of California Statewide IPM Program

Inside the Average American Brain: A Path to Better IPM Communications, Session II:

- Six general strategies for framing communications on IPM/farming
- Small group work to apply the six strategies to participant samples and other business/academic/NGO messages
- Unique aspects of science/academic communications
- Unique aspects of business communications

16. Controlled Environments to Weather Changing Climates

Breakout Topic: Agriculture (Row/Field Crops)

Location: Garden Room

Session Abstract: Controlled environment agriculture (i.e., indoor or protected cultivation) is growing in adoption worldwide to maximize crop production and to protect against unpredictable weather events. However, controlled environments often support a hospitable environment for disease and invertebrate pests to flourish. To support the adoption of controlled environments, growers need access to novel IPM tools that are tailored to the diversity of controlled environments present. This session will showcase controlled environments ranging from simple plastic tunnels to high technology greenhouses with an emphasis on major pest challenges and IPM solutions. A discussion will be hosted at the end of the symposium to discuss high priority needs and a roadmap for future projects and collaborations.

Organizer: Samantha Willden, Assistant Professor, Geneva Entomology, Cornell AgriTech, USA

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8:00 AM

16.1 Samantha Willden, Assistant Professor, Geneva Entomology, Cornell AgriTech, USA

Tailoring IPM to Controlled Environments That Buffer Against Climate Change is not A "One-Size-Fits-All" Effort: Controlled environment agriculture (CEA) is considered the frontier of agricultural systems by moving crop production under plastic or glass to protect against climate uncertainty and to maximize crop production using fewer resources. CEA exists along a continuum of technologies that influence growing conditions and pest pressure. It is imperative that this information is considered regarding holistic integrated pest management. This talk will summarize the different types of controlled environments in the U.S. and how IPM programs should be tailored to address the needs of each system.

Co-Author: Laura Ingwell, Purdue University

8:25 AM

16.2 Marlo Gunnar McCarter, Purdue University, (1st presenting author)

High Tunnels and High Temps; Temperature Differences in High Tunnels and Implications for IPM: High tunnels are enclosed structures designed to extend the growing season by providing controlled conditions for crops. This study examined whether high tunnel temperatures exceed those of the surrounding environment, particularly during winter, when higher temperatures could improve overwintering conditions for pests. Results showed that high tunnels maintain consistently higher and more stable temperatures compared to the outside landscape, influencing insect behavior such as foraging and flight. These findings highlight the need to consider temperature dynamics in the development of integrated pest management strategies for high tunnel systems.

Co-authors: Samantha Willden[2], Anna Wallingford [3], Kacie Athey [4], and Laura Ingwell[1]. [1]Purdue University, (1st presenting author), [2]Cornell AgriTech, [3] USDA-ARS, Invasive Insect Behavior & Biocontrol Lab, Beltsville, MD, [4] University of Illinois Urbana-Champaign

8:45 AM

16.3 Kacie Athey University of Illinois Urbana-Champaign (1st presenting author); **Bronwyn Aly,** University of Illinois Extension, USA

Biological Control in High Tunnels: Using Predator Release and Cut Flowers to Enhance Pest Control: Pest management in high tunnels can be complicated and recent research into non-chemical control techniques, focusing on biological control, will be discussed. Releasing insects in high tunnels helps control aphids and spider mites. Thrips control, on the other hand, is more complicated. Using cover crops and cut flower strips enhances predators in high

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tunnels, but the effect on yield and pests is more complicated. The results of both projects will be discussed in this talk.

9:05 AM

16.4 Conclusion to session 1 of 2. 10-minute break.

9:25 AM

16.5 Arash Kheirodin, Texas A&M University, USA (1st presenting author)

Integrating Selective Products Into Sweet Potato Whitefly Management in Controlled Environment Agriculture: Developing a successful integrated pest management program in CEA rooted in compatibility of different management pillars within the program, resulting in synergistic pest control. Biological control programs offer much promise in CEA, where the density and diversity of natural enemies can be manipulated using augmentative natural enemy releases. However, the success of biocontrol programs in part depends on the use of selective products that complement biocontrol, highlighting the importance non-target product testing. Hence, in this research, we studied the compatibility of a few chemical insecticides (Propoxyphene and Cyantraniliprole) and entomopathogenic fungal strains (*Beauveria bassiana* GHA and *Cordyceps javanica* Apopka 97) with two *Bemisia tabaci* predators. We studied these products affect on *Geocoris punctipes* and *Hippodamia convergens* feeding rate, prey preference, and survivorship. Our results indicate the species-specific response of *G. punctipes* and *H. convergens* towards these products, highlighting the need for species-specific research.

Co-authors: Katerina Graham[1], Albertha Parkins[2] and Jason Schmidt[2]. [1] Texas A&M University, (1st presenting author), [2] University of Georgia

9:45 AM

16.6 Jonathan Lee, The Ohio State University, Department of Entomology, USA (1st presenting author)

Advancing Greenhouse Integrated Pest Management: Innovative Pest Detection through Technological and Molecular Approaches: Greenhouses provide an ideal environment for plant growth, but they also attract a wide range of arthropod pests. Traditional pest detection methods, such as sticky cards and visual inspections, often fail to identify these pests, which can remain undetected. Our research investigates the potential of advanced techniques—environmental DNA collection and amplification, near-field infrared sensing, and plant volatile profile analysis—for more effective pest detection and monitoring in greenhouse environments.

To date we have shown that environmental DNA is a viable technique to identify sweet potato whitefly, and two-spotted spider mites. We aim to demonstrate the feasibility of these methods by presenting our most recent results as viable tools for enhancing integrated pest management, marking an

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important step toward their broader application in greenhouse settings.

Co-authors: Dr. Christopher Ranger[2], Dr. Ashley Leach[1], Dr. Andrew Michel[1], Dr. Enrico Bonello[3], Dr. Michael E. Reading[2] and Dr. Luis Canas[1]. The Ohio State University, Department of Entomology, [2] USDA-Agriculture Research Service, [3] The Ohio State University, Department of Plant Pathology

10:05 AM

16.7 Ambrosia E. Havan, Department of Plant Pathology, The Ohio State University, USA (1st presenting author)

Anaerobic Soil Disinfestation: An Emerging, Sustainable Soilborne Disease Management Strategy for Cut Flower Growing in Protected Cropping Systems: Soilborne diseases are a major limitation to crops grown directly in soil, and cut flowers are no exception. Many cut flower growers use sustainable farming practices as these are highly valued by customers; however, management of soilborne pathogens can be particularly challenging. Anaerobic Soil Disinfestation (ASD) has been investigated over the last two decades as a sustainable, inexpensive means of soilborne disease management, largely in vegetable crop production. This presentation will explore how ASD works and the current body of knowledge on its effectiveness in cut flower growing in protected cropping systems.

Co-authors: Daniela Gutierrez Yanez[1], Anna L. Testen[2], Francesca Peduto Hand[1]. [1] Department of Plant Pathology, The Ohio State University, [2] USDA-ARS-ATRU, Wooster, OH

10:25 AM

16.8. Dominique Holtappels, Cornell AgriTech, USA (1st presenting author).

The Potential of Bacteriophages To Control Emerging Bacterial Diseases in Controlled Environment Agriculture: The development of disease is an intricate evolutionary process influenced not only by the abiotic environment and the genetics of plants and pathogens, but also external biotic drivers. Bacteriophages as bacterial viruses are demonstrated to be critical biotic drivers of microbial communities - and the evolution of bacterial pathogens. We focus on the role of these bacterial viruses on the disease ecology of several bacterial diseases emerging in CEA conditions, using an integrated approach of bioinformatics, wet lab, and plant bioassays to understand how these viruses are steering the evolution of bacterial phytopathogens. Drawing from these findings, we study the potential of lytic phages as a measure to mitigate bacterial diseases with respect to the pathogen's ecology and contemporary farming practices.

10:45

16.9 Facilitated by Samantha Willden

Concluding remarks to session 2 of 2

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17. Data-Driven IPM

Breakout Topic: Urban Structural/Landscape

Location: Sunset 3

Session Abstract: The use of modern data analytics and artificial intelligence (AI) has transformed many industries, and pest control no exception. Today, many urban pest companies use route planning software to optimize travel from the office to customer sites, reducing both fuel consumption and time spent in traffic. Advanced computing is also prevalent in GIS, DNA analysis, and other molecular studies. Nevertheless, an average IPM practitioner probably rarely utilizes data operations beyond simple excel formulas. While there is a strong justification for why this is the case, such as the seemingly unpredictable nature of organisms, this doesn't mean that IPM practitioners should overlook the significant advantages of using modern data operations and AI. Using such technologies can significantly reduce costs, improve quality, and enable IPM practitioners to achieve outcomes that were previously unattainable.

This session will explore the use of advanced data analytics and artificial intelligence (AI) in enhancing Integrated Pest Management (IPM) programs. The primary goal of this session is to demonstrate how IPM specialists can utilize data analytics and AI to speed up data reconfiguration, data gathering and processing, and expand the currently available data to promote IPM. Specific objectives include presenting audience on the applications of modern data technologies in IPM, showcasing successful case studies, and discussing potential challenges and solutions. The term "data" here may include data collected in the field and laboratories, those collected by citizen-science projects, as well as those collected by local, federal, and international agencies.

Session attendees are encouraged to join a mailing list, to stay in touch after the symposium for exchanging ideas about data management methods and to initiate collaborative projects.

Organizer: Siavash Taravati, UCCE-Riverside & University of California IPM program, USA

8:00 AM

17.1 Siavash Taravati, UCCE-Riverside & University of California IPM program, USA

Keynote Hot Topic Talk: Biocontrol & New Technology

A beginner-Friendly Guide on Using Data Analytics and AI to Advance IPM: The integration of artificial intelligence (AI) and advanced data analytics presents new opportunities to enhance IPM practices. In this talk, I will

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provide easy-to-follow examples of using AI and advanced analytics in IPM.

My talk provides easy examples of how to use tools such as relational database management systems (e.g., MySQL) for data storage and searching, scripting languages for backend and frontend data processing, and Python for advanced analytics and machine learning. Additionally, attendees will discover how to integrate AI through ChatGPT and its API, enabling natural language processing for data interpretation and data expansion.

Tailored for those with minimal coding expertise, this talk breaks down complex concepts into digestible, hands-on demonstrations. By learning about user-friendly data management tools, attendees will leave equipped with the necessary knowledge to start exploring and implementing AI and data analytics in their IPM workflow to enhance pest management practices.

8:45 AM

17.2 Leslie Hickle, Co-founder, Farmsense, Inc., USA

BioInspired Closed Loop System for Managing Pests: Autonomous real-time, in-field pest sensors coupled with the computational power of AI and ML enabled the development of a novel closed-loop system for the first time in IPM. This system utilizes feedback from multiple inputs which eliminates pest uncertainty while concurrently reducing errors and improving the accuracy of pest prevalence and potential economic damage and treatment outcomes. The data acquired from these sensors is translated into accurate personalized actionable information for each unique farming operation and can trigger alerts and appropriate responses for the stakeholder.

L. Hickle, T. Ellis, S. Singh, E. Keogh, C. Kitayama;. FarmSense, Inc. 2025

9:45 AM

17.3 Alireza Pourreza, PhD., Associate Professor- Extension, University of California Davis, USA

Transforming Pest Management with AI and Data Driven Decision Making: Effective pest control is essential for sustainable agriculture and urban environments. This talk explores how data analytics and artificial intelligence are revolutionizing Integrated Pest Management (IPM). By enhancing pest detection and monitoring, these technologies offer precise and efficient solutions. We'll discuss innovative approaches and illustrate them with case studies on soil-borne pathogen detection and broomrape weed identification in tomatoes, demonstrating the impact of data-driven methods in advancing IPM practices.

10:30 AM

17.4 Anna Iversen, BCE, US Technical Director, Pelsis North America

Efficiently Identifying Pest Control Solutions with AI-Generated Digital Insect Light Trap Data: Filth flies are

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known vectors of foodborne pathogens, and they're particularly common in accounts that cannot be highly reliant on pesticides for preventative control. Instead, monitoring and exclusion are essential for a quick response. While traditional ILT monitoring relies heavily on the technician to count and identify glue board contents, AI technology allows for off-site remote monitoring. In this talk, we'll explore how to PCOs have used the digital ILT's AI-generated data to decrease their response time, pin-point population sources before reaching critical levels, ensure compliance with regulatory agencies, and provide a more thorough and efficient service.

18. Bringing IPM to New and Underserved Audiences

Breakout Topic: Public Health

Location: Sunset 1 & 2

Session Abstract: This session will describe how extension and public health programs can bring IPM to audiences not familiar with IPM. What programs, tools, outreach, and research projects have helped address emerging public health issues, bridge language barriers, and bring much needed pest information and relief to audiences that don't typically seek out pest management information. The panel will also reveal where more interventions and research are needed to address pests in homes and communities, and pesticide safety on and off farms. Speakers will engage audiences and challenge us to think about how we share information and how it is received.

Effective community engagement and outreach involves careful planning and understanding of each population that we work with. Each target audience is unique and offers new opportunities to expand impacts, improve health outcomes, and create healthier communities. In his Inclusive Outreach and Engagement Guide, Mike McGinn lists 6 essential strategies for inclusive engagement: 1. Build personal relationships with target population, 2. Create a welcoming atmosphere. 3. Increase accessibility 4. Develop alternative methods for engagement 5. Maintain a presence within the community and 6. Partner with diverse organizations and agencies. Each of the projects in this session highlights how these strategies can be applied in effectively sharing pest management and pesticide safety information. From tick borne disease outreach to pesticide safety education in Spanish we're learning new ways we can engage with new audiences and improve IPM outreach.

Organizer: Susannah Krysko, Cooperative Extension Specialist, Northeastern IPM Center

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8:00 AM

18.1 Alma R Galván, Director of Community Engagement and Worker Training, Migrant Clinician Network, USA

Reaching Underserved Audiences and Farmworkers with Pesticide Safety and Integrated Pest Management: MCN strategies: During this bilingual (English-Spanish) presentation we will identify the challenges facing hard-to-reach and farmworker populations, reflect on systemic/structural barriers they face, and describe Migrant Clinicians Network's strategies and effective practices in the development of educational materials for underserved populations.

8:40 AM

18.2 Alejandro Calixto, Director, NYS IPM Program, Cornell University, USA

Meeting Audiences Where They Are: Providing invasive species and public health pest outreach to farm workers and community members: Discover the NYS IPM Program's initiatives to foster engagement with Spanish-speaking communities, ensuring that IPM practices and strategies are accessible to all New Yorkers. You'll learn how programs and IPM specialists have been actively engaging and empowering Spanish-speaking communities in both agricultural and urban environments to adopt IPM practices and improve pesticide safety. **20 min**

9:00 AM

18.3 Amara Dunn-Silver, Senior Extension Specialist, NYS IPM Program, Cornell University; **Matt Frye**, NYS IPM Program, Cornell University, USA

Lessons Learned from Efforts to Provide IPM Education to Rural and Urban Spanish-Speaking Audiences: Since 2021, the New York State Integrated Pest Management Program has been offering monthly, virtual educational programming in English to help the general public implement IPM. Based on live attendance and views of recorded content, as well as survey responses from attendees, the What's Bugging You First Friday program is very successful. In 2022, we began offering some of these virtual events also in Spanish (Conozca Su Plaga), but attendance has been very low. In this talk we will discuss what actions we have taken to try to boost attendance and better understand the needs of Spanish-speaking audiences in New York State, as well as the potential barriers to their participation in this programming. **20 min**

9:20 AM

18.4 Susannah Krysko, Cooperative Extension Specialist, Northeastern IPM Center; **Ray Delaney** Community Program Specialist, Pennsylvania IPM Program, USA

Urban Integrated Pest Management Technician Training Project: **Adapting program implementation with insight and feedback from the community:** Through a partnership involving Penn

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State IPM, the Energy Coordination Agency (ECA) of Philadelphia, industry partners, and funding from the Environmental Protection Agency, the Urban Integrated Pest Management Technician Training Project (UIPM) was established in 2022. This job training program prepares residents of North Philadelphia to become licensed pesticide applicators and provide integrated pest management services to underserved residents in three predominantly Latino and Black neighborhoods. Discover how it was developed and evolved with input from participants.

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19. Student Voices on Integrated Pest Management

Breakout Topic: Cross-Disciplinary

Location: Sunset 4

Session abstract: Listen to talks by students on various aspects of IPM. Participate in scoring competition presentations and share your experiences and questions.

Organizer: Dawn Gouge, Specialist, Public Health IPM Medical Entomology Professor, University of Arizona, USA

8:00 AM

Dawn Gouge, Specialist, Public Health IPM Medical Entomology Professor, University of Arizona, USA

Welcome and Introduction.

8:10 AM

19.1 Rachel M. Denny, PhD student, Louisiana State University, Health Sciences Center, USA

Multi-level Analysis of Environmental and Social Variables to Inform Strategies for Municipal Integrated Rodent Management: Commensal rodents, primarily the Norway rat, roof rat, and house mouse (*Rattus norvegicus*, *Rattus rattus*, and *Mus musculus*, respectively) are a major issue in urban areas due to their associated economic and public health impacts. They contaminate food, destroy property, and damage critical infrastructure, which results in significant cost for municipal and private entities. Additionally, commensal rodents reservoir and transmit pathogens of human health significance, which can stress public health systems and reduce overall population health. Despite this, there are few public rodent control programs in the United States, and only a handful perform surveillance due to a variety of programmatic barriers. The relationship between social and environmental conditions and rodent activity has been well established, but current studies are limited and focus primarily on census-tract level variables, which can mask nuances in spatial differences, and environmental surveys, which are labor-intensive and

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limited in their scope. Here, we triangulate different datasets from the city of New Orleans including rodent program data (e.g. requests from the 311 reporting system), residential survey data, code enforcement violations, lot abatement requests, gaps in sanitation services, economic and insurance ratings (e.g. FEMA flood zones, historical HOLC designations), and sociodemographic data (e.g. American Community Survey) and assess the association of environmental and social variables at the parcel, block, multi-block, and neighborhood levels with rodent activity. The findings from this study will assess the utility of a surveillance system based on proxy variables that can improve and localize operational activities of municipal integrated rodent management programs.

8:25 AM

19.2. Breh Ruger, PhD student, The Ohio State University, USA

Finding Balance: Squash Bug Thresholds, Pesticide Frequency, and Toxicity to Beneficial Insects in Cucurbit Cropping Systems: Squash bugs (*Anasa tristis*) pose significant threats to cucurbit cropping systems through feeding injury, transmission of cucurbit yellow vine disease (CYVD), and the consequent reduction in marketability. While action thresholds for managing squash bugs exist, they lack validation from field experiments. Our study aims to address this gap by comparing different thresholds for squash bugs at varying life stages alongside the effectiveness of two insecticide products: a neonicotinoid (Assail) and a pyrethroid (Warrior). Using a factorial design, we will assess the impact of three different squash bug thresholds, as well as a weekly application, with two chemical management products with differing toxicities to beneficial organisms. IPM strategies encompass a range of factors, including application frequency, toxicity to beneficial species, and overall success in pest control. This presentation will outline the findings of our research experiment, shedding light on how these management strategies influence squash bug control in cucurbit crops, as well as its potential implications for beneficial insects, like pollinators.

8:40 AM

19.3 Arnol Gomez, PhD. student, The Ohio State University, USA

Impact of Non-chemical Management Approaches on Thrips and Natural Enemies in Peppers: Pepper is a high-value specialty crop in the Midwest, generating more than $20 million annually. Flower thrips pose a significant threat to pepper yield by feeding on the fruit and transmitting viral pathogens. Thrips populations can be managed effectively through the use of natural enemies such as minute pirate bugs, lady beetles, and lacewing larvae. Additionally, thrips are negatively affected by reflective mulches and reduced fertility regimes. However, the combined effects of these mulches and fertility practices on both thrips and their natural enemies remain poorly understood. There is potential for these methods to

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synergize with nonchemical approaches, enhancing pest control in pepper production and contributing to more sustainable agricultural practices in the Midwest. Further research is needed to fully understand and optimize these interactions.

8:55 AM

19.4. Christopher Hayes, PhD student, North Carolina State University, USA

Review on the Impacts of Indoor Vector Control on Domiciliary Pests: Good Intentions Challenged by Harsh Realities: Arthropod vectored diseases have been a major impediment to societal advancements globally. Strategies to mitigate transmission of these diseases include preventative care (e.g. vaccination), primary treatment and most notably, the suppression of vectors in both indoor and outdoor spaces. The outcomes of indoor vector control (IVC) strategies, such as long-lasting insecticide-treated nets (LLINs) and indoor residual sprays (IRSs), are heavily influenced by individual and community-level perceptions and acceptance. These perceptions, and therefore product acceptance, are largely influenced by the successful suppression of non-target nuisance pests such as bed bugs and cockroaches. Adoption and consistent use of LLINs and IRS is responsible for immense reductions in the prevalence and incidence of malaria. However, recent observations suggest that failed control of indoor pests, leading to product distrust and abandonment, may threaten vector control program success and further derail already slowed progress towards malaria elimination. We review the evidence of the relationship between IVC and nuisance pests and discuss the dearth of research on this relationship. We make the case that the ancillary control of indoor nuisance and public health pests needs to be considered in the development and implementation of new technologies for malaria elimination.

Co-Author: Coby Schal North Carolina State University, USA

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20. Specialty Crops IPM in the Changing Global Environments

Breakout Topic:
Horticulture/Specialty Crops

Location: Sunset 5

Session Abstract: Healthy, sustainable, and inclusive food production systems are critical for global food security. Between 20-40% of the world's crop production is lost due to pests annually. The global challenges of human population growth, food security, and climate change continue to pressure specialty crop growers to ensure their production systems are healthy, productive, safe, and resilient. Indeed, climate change represents one of the most significant challenges humans have faced in recent years. These changes

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significantly influence the biology, ecology, occurrence, geographical distribution of pests, pest-host-plant interactions, and associations with their natural enemies.

The changes in global environments are impacting the efficacy of pest control measures in specialty crops. Integrated Pest Management (IPM) is evolving with specialty crop production practices and under the recent climate changes. The latest IPM advancements in modern food production systems are vital for their growth and sustainability for producers, consumers, trade partners, and global economies. Many IPM strategies are now well-developed under protected crop production settings. However, in many situations, targeted success is yet to be achieved within the open fields. There is a constant need to evaluate the efficacy of IPM techniques under different and altered environmental conditions and to adapt IPM to changing climate.

Delivering more sustainable farming will require a combination of skilled practitioners, novel approaches, and innovative technology to sustain crop productivity and profitability. This IPM session is intended to provide an outstanding networking and professional development platform to pest managers, extension agents, industry personnel, scientists, and educators to showcase their respective achievements.

Organizer: Muhammad Haseeb, Center for Biological Control, College of Agriculture and Food Sciences, Florida Agricultural and Mechanical University, USA; Youichi Kobori. Japan International Research Center for Agricultural Sciences, Ibaraki Japan

8:00 AM

20.1 Jawwad A. Qureshi, University of Florida, Institute of Food and Agricultural Sciences, Department of Entomology and Nematology, Southwest Florida Research and Education Center, USA

Integrated Pest Management for Asian citrus psyllid), *Diaphorina citri*: The Asian citrus psyllid (ACP), *Diaphorina* citri Kuwayama, is an economically important insect pest of citrus worldwide, mainly due to its role as a primary vector of '*Candidatus* liberibacter asiaticus', which causes huanglongbing (HLB) or citrus greening. ACP- In Florida, this vector and disease were reported in 1998 and 2005, respectively, and established. ACP management is critical to reducing the spread and severity of HLB. Biological control has played a significant role in suppressing citrus pests including ACP, causing mortality in its populations averaging 80% or more. Chemical control increased after HLB was found and contributed significantly to ACP suppression with strategies developed for dormant and growing season populations. We also investigated Citrus Under Protective Screen (CUPS) and Individual Protective Covers (IPCs) systems for citrus production. Both systems were effective in bringing young trees into production with better health and higher yields than open production systems and

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without ACP-HLB. Findings from the research and implementation of ACP-HLB management in traditional open and protected environments will be discussed.

8:15 AM

20.2. Daniel Collins, Department of Agriculture, Alcorn State University, USA

Small Farm Climate Smart IPM Practices for Underserved Communities: As climate change continues to intensify and create new pest threats, it is critical that we develop research and extension programming to mitigate the impacts of climate change on crop production. Underserved farmers and communities are especially vulnerable due to limited resources and lack of integrated pest management training in climate smart agriculture. To identify small farmers' plant health management concerns ten (IPM) workshops and farm visits were conducted to interact and dialogue with a diverse group of underserved small farmers to identify pests impacting small farms. In addition to the workshops a preliminary plant pest survey was conducted on small farms over two summers 2023-24. Ten small farms were surveyed in Adams, Claiborne, Bolivar, Quitman, Hinds, Forest and Pearl River counties Mississippi and St. Helena and East Baton Rouge Parishes, in Louisiana. Plants exhibiting plant disease signs or symptoms, and insect infestation were collected and transported to the plant diagnostic laboratory at Alcorn State University for identification. A wide variety of fungal plant diseases were identified such as southern blight on tomatoes *Cercospora* leaf spot on squash. Bacterial diseases identified included fire blight on pears, and bacterial leaf spot on peppers. A variety of insect pests were identified on vegetable crops including stink bugs, aphids, tomato hornworms, army worms, and squash bugs. Major plant health management concerns of undeserved small farms included training and demonstrations on proper climate smart IPM strategies.

Co-author: Tahir Rashid. Department of Agriculture, Alcorn State University, USA

8:30 AM

20.3 Youichi Kobori. Japan International Research Center for Agricultural Sciences, Ibaraki Japan

Development of an IPM System Against the Fall Armyworm in Southeast Asia: The fall armyworm (FAW), *Spodoptera frugiperda*, is a serious lepidopteran pest, particularly in corn production. FAW was found in Southeast Asia in 2018 and has spread rapidly throughout many Asian countries. Owing to the frequent use of certain inexpensive and readily available insecticides, the development of insecticide resistance in Southeast Asia has become a concern. Therefore, developing the IPM system is urgently required for sustainable corn production in this region. Accordingly, the Japan International Research Center for Agricultural Sciences and collaborators are developing such a system based on the

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corn cultivation cycle and the ecological characteristics of FAW in the region. First, simple FAW pesticide susceptibility monitoring methods contributing to international information sharing for risk assessment of resistant strain development are presented. Subsequently, basic knowledge of IPM system development, such as the side effects of pesticides on natural enemies and efficient pesticide application methods is discussed.

8:45- 9:00 AM 15-minute break

9:00 AM

20.4 Xavier Martini, Associate Professor, Entomology and Nematology Department, University of Florida, North Florida Research and Education Center, USA

Integrated Pest Management of *Bemisia tabaci* and *Diaphorina citri* using Kaolin and Essential Oils: Sustainable Solutions for Pest Control: This study explores the combined effects of a nanoclay (kaolin) and two essential oils (limonene or thyme) in managing sweet potato whiteflies (*Bemisia tabaci*), vectors of multiple viruses, and the Asian citrus psyllid (*Diaphorina citri*), which spreads the bacteria causing citrus greening. These pests are challenging to control due to their wide host range, mobility, and tendency to develop pesticide resistance. Kaolin, a natural clay mineral, is an effective irritant that reduces plant visual appeal and palatability, while the essential oils repel pests without contact. Lab and field trials in Quincy, FL (2019–2022) evaluated untreated controls, kaolin, essential oil, kaolin-essential oil mixtures, and treatments with food coloring. Combined treatments significantly reduced pest densities and disease incidence, though efficacy in the field declined in wet conditions. This study highlights the potential for sustainable, cost-effective pest management strategies using kaolin and essential oils.

Co-authors: Paris, M. Thomson, Romain Exilien**;** [1]Entomology and Nematology Department, University of Florida, North Florida Research and Education Center

9:15 AM

20.5 Kris Lord T. Santos and Divina M. Amalin, Institute of Biological Control, De La Salle University, Philippines

Integrated Pest Management of Major and Emerging Insect Pests and Diseases of Sweet potato in the Philippines: Sweet potato is an important staple and vegetable crop in the Philippines. However, low productivity is often encountered due to the impact of insect pests and diseases. An integrated pest management (IPM) system was devised in the 1990s primarily to control the sweet potato weevil (*Cylas formicarius*), a major insect pest of sweet potato. Yet, this insect pest remains a major constraint on production, and other insect pests and diseases continue to emerge as a result of changes in the global environment. There is thus a need to reevaluate and modify the existing IPM system for sweet potato. This presentation will include discussion on

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potential tools that can be incorporated into the existing IPM system. These tools include combined sex pheromone and oviposition attractant trapping systems, particle film technology, nanobiosensors for rapid disease diagnostics, among others.

9:45 AM

20.6 Scott Croxton, Technical Development Representative, Bayer, USA

Careful Use of Selective Pesticides to Preserve and Bolster Biological Control Programs in a Changing Environment: Bayer is an innovative, research driven company dedicated to all agricultural crops. In this presentation we will explain how to use product labels to determine how well a product will fit in an IPM program. This includes different ways of extracting information from labels that can be useful in many situations. Real world examples will be used.

10:00 AM

20.7 Alejandro Bolques, Cooperative Extension Program Assistant Director, College of Agriculture and Food Sciences, Florida A&M University; Muhammad Haseeb and Lambert H.B. Kanga, Center for Biological Control, College of Agriculture and Food Sciences, Florida A&M University, USA

IPM of Selective Specialty Crops in Passive Protective Structures and Open Field conditions in North Florida: Like any cultivated plant, specialty crops are susceptible to insect pest pressure from white flies, aphids, and thrips. Efforts at the Florida A&M University (FAMU) Research and Extension Center (REC) in Quincy, FL, are being used to manage pests by "push-pull" technology and companion planting. These practices are managing insect pests in strawberries (*Fragaria x ananassa*) and leaf lettuce (*Lactuca sativa*) in high tunnels. Another pest management strategy is using biochar as a soil amendment in collard green (*Brassica oleracea*) production. We will discuss some of the findings from our Extension specialty crop studies and our biochar experimental plots. As we continue to develop these tools, the results are disseminated through field days and workshops by Extension educators and research faculty.

10:15 AM

20.8 Weerakorn Saengsai, Khon Kaen Field Crops Research Center, Muang Kaeon, Thailand

Antagonistic Effectivity of *Bacillus subtilis* and Streptomyces spp. in Controlling Diseases in Various Crops in Thailand: Anthracnose disease of avocado and black root rot of strawberry are a major disease in northern of Thailand. Current control of this disease relies heavily on the use of fungicides, both before and after harvest. Worldwide consumer concern over the use of pesticides in agriculture has prompted the search for non-chemical alternatives to fungicides for disease control in many horticultural crops. Biological control,

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using *Bacillus subtilis* isolated from rhizosphere, has been shown overseas to have considerable potential for the control of a range of preharvest and postharvest diseases of avocado and strawberry. The aim of this research was to evaluate biological control for anthracnose of avocado and black root rot strawberry in vitro.

Co-authors: Benjawan Rattawat, and Suchirat Sakuanrungsirikul
Khon Kaen Field Crops Research Center, Muang Kaeon, Thailand

10:45 AM

20.9 Jhalendra Rijal, University of California Agriculture and Natural Resources & Statewide IPM Program, USA

Impacts of Drought and Climate Change on High-Value Tree Nut Pests in California: California is a prominent global supplier of major tree nuts – walnut, almond, pistachio- and some tree fruits, contributing to over $10 billion US dollars. However, increased environmental stresses caused by drought and climate change have posed serious challenges to production and plant protection systems, especially under future climatic conditions. We studied multiple economically important insect pests of tree nuts and tree fruits in California and assessed the potential impacts of climate change and drought on them. The pests include codling moth (*Cydia pomonella*), peach twig borer (*Anarsia lineatella*), Oriental fruit moth (*Grapholita molesta*), navel orangeworm (*Amyelois transitella*), Pacific flatheaded borer (*Chrysobothris mali*) and more. Utilizing a validated growing-degree days (GDD) model, calibrated with data from California orchards, and incorporating climate change projections from General Circulation Models, our findings indicate anticipated biofix date advancements of up to 28 days.

Depending on the scenarios, the number of generations increased by 1-1.4 by the century's end. Similarly, there have been increased activities of invasive and resurgence of indigenous insect pests due to severe drought within the last decade. The findings will be discussed when developing and strategically implementing integrated pest management (IPM) practices in the future under evolving climate challenges.

11:00 AM

20.10 Muhammad Haseeb, Center for Biological Control, College of Agriculture and Food Sciences, Florida Agricultural and Mechanical University, USA

Developing Minority IPM Leaders in the Specialty Crops in Florida: Invasive and established insect pests pose serious challenges to specialty crops in Florida. Our trade partners, industry, and consumers need proper management of invasive pests to sustain food security and to streamline trade. Among the 1890 Land Grant Universities of higher education, Florida A&M University is taking the lead in training minority students to sustain the national workforce and cultivate minority

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leaders in pest management. The critical problem of low enrollment in agricultural sciences is perhaps due to the continued apathy for agriculture among minorities. The current focus of our activities is on the digital identification of specialty crop insect pests, especially the pest weevils (Coleoptera: Curculionidae). In addition, emphasis is being given to manual and digital detection, monitoring, and management of insect pests in the specialty crops in Florida.

21. Sysco's Sustainable Agriculture Program: A Case Study on IPM Program Implementation and Evolution

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: Amidst intensifying impacts from climate change such as rising temperatures, altered precipitation patterns, and more frequent weather events, food systems become more vulnerable to pests and disease. Now more than ever, it is imperative to ensure Integrated Pest Management (IPM) strategies are implemented that allow for a safe and resilient food supply. However, broadscale IPM is not successful without the collaboration of actors throughout the food supply chain from growers, producers, distributors, and retailers. In this session, we will present the success of Sysco's Sustainable Agriculture Program in tandem with the Sustainability Standard certification that has shifted the industry towards formal IPM implementation, tracking, and real-world impacts.

Sysco has been a pioneer within the food sector with their flagship Sustainable Agriculture Program; the program was launched in 2004 with canned and frozen produce suppliers and expanded to fresh produce suppliers in 2021. In collaboration with the IPM Institute, through annual data collection and analysis of Environmental Indicator Reports, it has been estimated that Sysco's Sustainable Agriculture Program has resulted in the avoidance of 6.2 million pounds of pesticides in 2022 alone, through robust implementation of IPM practices. This program has supported overall industry alignment on sustainability and pollinator policies, including retailers such as Walmart, Kroger, and Giant Eagle.

This interactive session aims to bring in key actors from Sysco and IPM Institute, along with some of Sysco's fresh, canned, and frozen suppliers, with the aim of sharing successes, challenges, and lessons from their in-depth experiences with IPM and building a more sustainable food system.

Organizer: Ariel Larson, Department Director, Sustainable Food Group, IPM Institute of North America, USA

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9:45 AM

21.1. Ariel Larson, Department Director, Sustainable Food Group, IPM Institute of North America, USA; **Shane Sampels,** Senior Director, FSQA Produce, Sysco; **Kartika Charan**, Director, FSQA, Sysco

Presentation: Program introduction and history; Impacts and outcomes; Success stories

10:25 AM

21.2 Kartika Charan, Director, FSQA, Sysco; **Jeremiah Sasser,** Director FSQA, Superior Foods; **Rubana Suthakar**, Sustainability Manager, The Giorgi Companies, Inc.

Panel discussion: Implementation; Program challenges from a supplier perspective; Challenges from a program management (Sysco/IPM Institute) perspective; Q&A/discussion.

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22. Enhancing Integrated Pest Management for Rodent Control

Breakout Topic: Public Health

Location: Sunset 1 & 2

9:45 AM

22.1 Rachel Denny, Doctoral Student Epidemiology, Louisiana State University, USA

From Archives to Abatement: Utilizing Historic Rodent Control Programs to Improve Modern Operations in the United States: In the early 1900s, the US Public Health Service created rodent control programs for urban areas with active transmission of plague. From there, the definition of "local rodent control program" has varied greatly. From the abundance of programs across the country in the post-WWII-era fervor for pest control to the modern but sparse and siloed programs, rodent control has represented more than just pest control. Rodent infestations in urban areas are known to burden poor, minority neighborhoods disproportionately. Federal entities, local government, and citizens themselves responded to this disparity across the decades through programs like the Baltimore Plan (1936) and Barry Commoner's Project Rat Countdown (1967), legislation such as Lyndon Johnson's 'Civil Rats' bill (1967), and grassroots activism and protests.

The programs of the 1930s through the 1970s emphasized an ecological approach to large-scale rodent control and essentially utilized what modern programs refer to as an integrated pest management approach. Rodent control remains as it was in the 1920s, the 1940s, and the 1970s and on- it is an issue of environmental justice and necessity in public health infrastructure. While modern programs are sparse, siloed, and often fall under the umbrella of other public programs, there is value in referencing the successes and failures of the past in order to promote the

implementation of an ecological (IPM) approach in modern programmatic operations.

Organizer: Janet Hurley, Senior Extension Program Specialist- IPM, Texas A&M University, USA

10:00 AM

22.2 Janet Hurley, Senior Extension Program Specialist- IPM, Texas A&M University, USA

How Sanitarians and Pest Management Professionals Should Approach Rodent Management in a More Holistic Manner: This session will cover how sanitarians should inspect facilities for pests like rodents, the signs to look for and what to report on their food safety inspections. For pest management professionals, how do you evaluate whether practices you are using are a success or you need to adjust? What works best, technology or assigning an individual to review service reports and develop scored rankings or utilize remote sensing data to help determine your efforts to success?

10:15 AM

22.3 Dr. Pete Coppolillo, Executive Director, Working Dogs for Conservation, **;** Mark Vick, Assistant Director for Programs, Working Dogs for Conservation, USA

Enhancing Integrated Pest Management with Detection Dogs: Insights and Innovations from Working Dogs for Conservation: Dr. Pete Coppolillo and Mark Vick from Working Dogs for Conservation (WD4C) will present pioneering applications of detection dogs in Integrated Pest Management (IPM) and biosecurity. WD4C leverages the extraordinary olfactory abilities of conservation dogs to address complex ecological challenges, including invasive species management, biosecurity, and environmental monitoring. This presentation highlights the innovative role of detection dogs in enhancing IPM strategies, focusing on minimizing pesticide use while ensuring targeted, efficient, and sustainable pest control.

Detection dogs excel at identifying diverse targets, from live animals and invasive plants to subterranean pests and microscopic organisms, offering unparalleled precision and reliability. By aligning these capabilities with IPM goals, WD4C demonstrates how conservation detection teams contribute to reducing chemical interventions, preserving biodiversity, and protecting ecosystems. This session will share key insights, case studies, and future opportunities for integrating detection dogs into IPM frameworks, promoting sustainable practices and fostering collaboration within the pest management community.

Working Dogs for Conservation (WD4C): Operates at the intersection of environmental conservation and

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Integrated Pest Management (IPM), leveraging the exceptional abilities of detection dogs to tackle complex ecological challenges. Our dogs are expertly trained to identify diverse targets, including invasive species and endangered wildlife. This abstract highlights past and ongoing projects and explores how detection dogs can enhance IPM strategies in changing environments.

Conservation Dogs at WD4C: WD4C utilizes detection dogs in global initiatives, focusing on biosecurity, invasive species management, ecological monitoring, anti-poaching, and environmental justice. Detection dogs can detect various targets including live animals, scat, weeds before they emerge, subterranean animals, aquatic organisms, microscopic larvae, disease-infected wildlife, and more.

Innovative Applications Supporting IPM: WD4C aims to pioneer novel approaches for detection dogs in pest management, enhancing the effectiveness and sustainability of IPM programs. Detection dogs provide precise, accurate, and reliable data. Utilizing detection dogs in these approaches aligns with IPM's goals of minimizing pesticide use while ensuring necessary interventions are as efficient and environmentally responsible as possible:

Conclusion: Conservation detection dog teams are incredibly valuable for enhancing pest management in complex environments due to their exceptional detection, tracking, and discrimination abilities. As a vital component of an integrated approach, these teams actively support the overarching goals of IPM and environmental conservation—minimizing chemical use, preserving biodiversity, protecting ecosystems, and ensuring the long-term sustainability of natural resources while mitigating human impacts. We look forward to sharing our research findings and exploring collaborations at the 2025 IPM Symposium.

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23. IPM's Climate Benefits in Agriculture: What Are They? How Can We Quantify and Generate Incentives to Spur Adoption?

Breakout Topic: Cross- Disciplinary

Location: Sunset 4 (I), Sunset Ballroom (II)

Session Abstract: IPM has proven incredibly valuable to US agriculture, protecting farmer income, improving crops and yields, reducing risks to humans and the environment, and addressing pesticide resistance. Yet IPM has no ongoing facility to proactively manage our nation's IPM portfolio of public and private sector priorities, programs, policies and approaches. As a consequence, we are often in crisis mode when responding to

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pest issues, reacting to challenges that are predictable and preventable. Our expert team has been working to develop a national Dialogue on Integrated Pest Management (IPM).

A broad convening on IPM priorities and approaches has not occurred since the Food Quality Protection Act in the 1990s and is long overdue to update programs and approaches to meet current challenges. An initial workstream developed through the Dialogue is developing IPM's potential to address climate challenges. IPM has tremendous, largely untapped potential to contribute to climate goals by reducing greenhouse gas emissions, sequestering carbon, and helping growers adapt to changing climate and pest pressures.

Leading experts in these emerging opportunities will share their objectives and outcomes to date, followed by an open discussion. Presentations will include an introduction to the IPM and Climate Consortium, a second Dialogue outcome, that offers long-term opportunities for collaborating with a broad, diverse coalition focusing on building and pursuing IPM priorities.

Organizer: Thomas Green, Board Chair, IPM Institute, USA

Session I: Setting the Stage

9:45 AM

23.1 Thomas Green, Board Chair, IPM Institute, USA

IPM: Key to Climate Smart Agriculture: The scientific literature and popular press provide many examples of how climate change threatens to accelerate movement of pests into new regions and increase potential for pest impacts in agriculture and communities. IPM has important roles in mitigating pest impacts, sequestering carbon, reducing emissions and optimizing outcomes in systems developed and adapted to address climate change. We'll survey the big picture and highlight the challenges we face in developing and capturing IPM's climate benefits in agriculture and gaining access to public and private sector climate incentives for IPM users.

10:05 AM

23.2 Keith Pitts, SVP-Sustainability and Regulatory Strategy, Bioceres Crop Solutions, USA

IPM and Climate Resilience Alliance: A New Research Consortium: IPM has untapped relevance to climate adaptive agriculture, resistance management, precision farming, and regenerative and sustainable agriculture that can create substantial benefits for farmers and the environment. At the same time, crop insurance, ecosystem services, new technologies, and market and finance incentives hold the potential to extend the reach and the impacts IPM adoption can provide. Realizing those benefits and capitalizing on that potential are critical to the future of agriculture and will require meeting substantial needs in support for research and development,

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implementation, market valuation, and validation of IPM impacts. Doing so will require the creation of a broader, more coordinated approach to IPM that can be better supported and more fully integrated with the key issues, research, technologies, and opportunities facing 21st Century agriculture.

10:25 AM

23.4 Maria Jaramillo, Senior Research Analyst, Boundless Impact Research & Analytics, USA

How Life Cycle Assessment (LCA) Uncovers Ecosystem Impacts in IPM: Irregular weather patterns resulting from climate change are expected to increase the frequency and distribution of pests and diseases, posing significant threats to global supply chains. The adoption of IPM and climate-smart agricultural practices is essential for protecting agricultural production systems and fostering resilient environments. Quantifying the benefits of these practices is crucial to measuring their positive impact on ecosystems and incentivizing their large-scale implementation. This session will explore how LCA can evaluate climate-smart agricultural practices and quantify their impacts on biodiversity and other environmental improvements.

11:00 AM

23.5 Thomas Green, Keith Pitts, Maria Jaramillo

Q&A with all presenters

Session II: Keynote Hot Topic Climate Change *(Thursday; 8:00- 9:30 AM)*

8:00 AM

23.5 Thomas Green, Board Chair, IPM Institute, USA

Part I recap and introduction

8:15 AM

23.6 Patricio Grassini, Sunkist Distinguished Professor of Agronomy, Agronomy & Horticulture, University of Nebraska, USA

Keynote Hot Topic Climate Change: Yield Gaps and the Importance of Crop Intensification Under Changing Climate: Meeting future demand for food, feed, fiber, and fuel without massive conversion of natural ecosystems and associated negative impact on biodiversity and climate change remains a challenge. While there is consensus about the need for sustainable intensification of agricultural systems, there is a lot of debate about the means to achieve it. My presentation will introduce a simple framework to screen approaches based on their expected contribution to sustainable intensification and show a number of case studies to illustrate how closing yield gaps through agronomic management can lead to positive productivity, economic, and environmental outcomes.

9:00 AM

23.7 Q&A

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24. Does it Work? Pest Management Efficacy of Creating Habitat for Insect Natural Enemies

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: The potential to attract arthropod natural enemies to assist with pest control is frequently touted as an added benefit of diversifying landscapes (especially around agricultural fields) and creating habitat for pollinators. However, the efficacy of this pest control method – a form of conservation biocontrol – can be more difficult to test empirically than IPM tools like pesticide applications or augmentative release of a biocontrol agent. Furthermore, it may be more difficult to give specific instructions to a grower or gardener as to exactly how to implement conservation biocontrol for maximum pest control efficacy at their site.

In this session, you will hear from speakers with experience implementing conservation biocontrol through habitat creation and evaluating its impact on pest management, both on farms and in urban/residential settings. You will learn in what settings and crops and against which pests this IPM tool has been implemented successfully, how conservation biocontrol fits into other IPM practices, and what was learned about essential determinants of success.

Attendees will leave with ideas about how they might support the implementation of similar strategies with their local audiences, strategies for communicating effectively about and encouraging implementation of conservation biocontrol, and a better understanding of research questions that remain to be addressed.

Organizer: Amara Dunn-Silver and Elizabeth Lamb, Cornell University, New York State IPM Program, USA

1:15 PM

Welcome and Introduction

1:18 PM

24.1 Dr. Elizabeth Rowen, Assistant Professor, Entomology Department, University of California Riverside, USA (co-authored talk with Carmen Blubaugh)

Cover Crops and Insect Pest Regulation: A Meta-Analysis: Cover crops provide benefits to farmers and to the environment that include improved soil health, water quality, and weed suppression. However, due to farmer concerns about management complexity, increased labor, uncertain economic returns, and the potential for increased pest susceptibility, cover crop adoption remains persistently low. We used meta-analysis to evaluate risks and benefits of cover crops for both pests and their natural enemies in cash crops. We identified crop system characteristics

(perennial and annual, crop families) and cover crop characteristics (terminated cover crops, living mulches, flowering cover crops, cover crop mixtures) that lead to the most reliable pest control outcomes. Overall, we found cover crops reduced pests and enhanced natural enemies, providing little support for "green bridge" effects purported to increase associational susceptibility to pests. Cover crops had consistent negative effects on herbivore pests across crop systems, natural enemy enhancement was stronger in perennial systems relative to annual systems, where greater seasonal disturbance system-wide might limit the pool of natural enemies available to respond to food and habitat resources provided by cover crops. Altogether, our results imply that cover crops pose negligible risks for pest outbreaks; instead they can be leveraged as a tool to promote natural pest suppression. Combining cover crops with other strategies that reduce seasonal disturbance might improve their efficacy in annual systems.

1:43 PM

24.2 Dr. Juli Carrillo & Matt Tsuruda (Dr. Carrillo will present on behalf of herself and grad student Matt Tsuruda), Associate Professor, Applied Biology, University of British Columbia, Canada

Habitat amendments in agriculture support diverse and abundant beneficial insect communities: The rapid adoption of industrial agricultural practices, including monoculture production and increasing inputs of chemical fertilizers and pesticides, has been a major driver of biodiversity losses in the modern age. These losses may be exacerbated by the loss of functionally diverse non-crop habitat which provision ecosystem services by supporting beneficial arthropods. Habitat restoration and other agricultural diversification practices may harness the benefits of vegetationally diverse habitats on insect communities to increase beneficial insect populations and diversity. We investigated how the arthropod community, and more specific beneficial insect taxa, responded to agricultural habitat amendments in terms of abundance, diversity, and community structure across multiple years and sites in the lower mainland of British Columbia Canada. We found that grassland-set asides supported higher abundances of both predatory and phytophagous insects compared to conventional cropped fields. More specifically, grassland-set asides supported more diverse and abundant communities of two important insect taxa, ground beetles (Family: Carabidae) and parasitoid wasps (Order: Hymenoptera). In addition, grassland set-asides supported significantly different communities of both taxa compared to crop fields. These results suggest that semi-natural agricultural habitat am

2:08 PM

24.3 Miles Dakin, Co-Director of Agricultural Programs, Pollinator Partnership, USA (co-authored talk with Dr. Lora Morandin)

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Evidence for the Efficacy of Conservation Biological Control and Removing Barriers to Adoption: Creating habitat within agricultural production systems has the potential to increase biological control of pest insects in crops. However, data that show benefits to pest control, crop production, and demonstrate pesticide reduction or economic savings are not plentiful, likely in part due to the difficulty in creating statistically rigorous studies to test impacts. Additionally, farmers are hindered by lack of technical and financial help when creating habitat, and concerns that habitat may increase pest pressure in crops.

We will outline a study in the central valley of California that examined pests, pest pressure in crops, pesticide use, and economic cost-benefit of creating native plant hedgerows in an intensive agricultural landscape. We will introduce the Bee Friendly Farming program that supports farmers in creating habitat for pollinators and other beneficial insects, and how we are increasing technical support and cost-offsets for growers through funding programs and NRCS partner biologists. We will introduce our PEST tool that helps farmers weed out plants from habitat that may support crop pests.

By generating data that tests the efficacy of conservation biocontrol, and removing other barriers such as technical know-how, costs, and pest pressure concerns, we are moving the needle towards wider acceptance and implementation of this practice as a practical and economical way to reduce pesticides while maintaining or enhancing production and profits.

2:33 PM

24.4 Panel & Audience Discussion

The potential to attract arthropod natural enemies to assist with pest control is frequently touted as an added benefit of diversifying landscapes (especially around agricultural fields) and creating habitat for pollinators. However, the efficacy of this pest control method – a form of conservation biocontrol – can be more difficult to test empirically than IPM tools like pesticide applications or augmentative release of a biocontrol agent. Furthermore, it may be more difficult to give specific instructions to a grower or gardener as to exactly how to implement conservation biocontrol for maximum pest control efficacy at their site. In this session, you will hear from speakers with experience implementing conservation biocontrol through habitat creation and evaluating its impact on pest management, both on farms and in urban/residential settings. You will learn in what settings and crops and against which pests this IPM tool has been implemented successfully, how conservation biocontrol fits into other IPM practices, and what was learned about essential determinants of success. Attendees will leave with ideas about how they might support the implementation of similar strategies with their local audiences, strategies for communicating effectively about and encouraging implementation of

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conservation biocontrol, and a better understanding of research questions that remain to be addressed.

25. Teaching IPM through Innovation in a Changing World

Breakout Topic: Communications & Outreach

Location: Dockside

Session Abstract: This session will showcase innovative educational strategies in Integrated Pest Management (IPM) designed to engage and inspire the next generation. Featuring the award-winning "Pest Friends" board game, attendees will engage in an interactive learning experience where they act as pest managers, making decisions about pest control to maximize crop yield and profits. Through eight rounds of gameplay, participants encounter IPM challenges such as resource limitations, pest infestations, and environmental challenges. A facilitator guides the game, and players learn about pest biology and management through monitoring, research and decision-making.

Additionally, the session will highlight successful IPM communication platforms, including "The Insect Hunter" YouTube channel, which has garnered over 9.7 million views and 65,000 subscribers, and the "Ask an Entomologist" website, co-created by one of our speakers. These platforms effectively use social media and online engagement to disseminate IPM knowledge. We will also showcase insect art created by Dr. Armando Falcon Brindis, an entomologist and artist, to illustrate the intersection of science and art in engaging educational approaches.

Speakers will share insights into the creation and impact of these educational tools, offering attendees a "behind-the-scenes" look at their development. Ample time will be provided for questions and answers, fostering interactive discussions.

Organizer: Jason Thomas, Associate Professor/Extension Educator, University of Idaho, USA

1:15 PM

25.1 Armando Falcon Brindis, Extension Specialist, University of Idaho, USA

Incorporating Insect Art into Integrated Pest Management Education: Incorporating creativity into Integrated Pest Management (IPM) education offers a unique and effective way to engage audiences and foster understanding of pests and beneficial insects. This presentation highlights the value of using insect artwork as an educational tool, drawing on the author's extensive experience showcasing detailed insect illustrations at field days and educational events in both Idaho and Kentucky. By combining science with art,

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these events have provided a fresh and engaging approach to IPM education, encouraging curiosity and appreciation for the ecological roles of insects. This creative method not only makes IPM concepts more accessible but also demonstrates how innovative strategies can enhance traditional education, leaving a lasting impact on diverse audiences.

1:30 PM

25.2 Jason Thomas, Associate Professor/Extension Educator, University of Idaho, USA

Innovative Approaches to IPM Education: Developing a Board Game and Focused YouTube Channel: The Insect Hunter YouTube Channel and Pest Friends Board Game represent innovative approaches to Integrated Pest Management (IPM) education, combining digital media and interactive gameplay to engage diverse audiences. The YouTube channel provides accessible, engaging content that explores the world of insects and pest management, reaching viewers with informative and entertaining videos. Complementing this, the Pest Friends board game offers a hands-on learning experience, allowing players to explore IPM principles through strategic gameplay. Together, these tools foster greater understanding of pest and beneficial species, emphasizing sustainable management practices in a creative and memorable way. This presentation showcases how these unique educational methods are being used to inspire curiosity and expand knowledge about IPM.

2:15 PM

25.3 Joanie King, Assistant Professor & Extension Entomology Specialist, New Mexico State University, USA

Engaging Communities with Entomology: Insights from 'Ask an Entomologist' and Other Educational Programs: The Ask an Entomologist blog harnessed the power of blogging and community engagement to answer public questions and build awareness about the fascinating realities of the insect world. Through years of dedicated participation, one of the authors contributed to this initiative by providing science-based answers to a wide range of entomological inquiries, fostering curiosity and dispelling myths about insects. By creating an accessible platform for public engagement, the program not only built a community of insect enthusiasts but also helped bridge the gap between scientific knowledge and everyday understanding, promoting awareness of insects' critical roles in ecosystems and encouraging informed perspectives on pest and beneficial species alike.

2:30 PM

25.4 Armando Falcon Brindis, Jason Thomas and Joanie King

Integrated Pest Management Q&A Panel

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26. Strategies for Improved Eco-Efficiency in Pest Management

Breakout Topic: Agriculture (Row/Field Crops)

Location: Garden Room

Session Abstract: Integrated Pest Management (IPM) remains one of the most crucial tools to minimize economic, human health and environmental risks associated with pest management. Unfortunately, IPM adoption among growers is often low or difficult to measure and the definitions or practices of IPM vary greatly depending on the crop, region and production system. Unlike organic or sustainable agriculture, IPM is not well recognized or understood by policymakers and the public. To address these limitations, we propose strategies to communicate, identify, quantify, track and incentivize eco-efficient (IPM) practices. Eco-efficiency includes strategies that aim to maximize benefit-cost ratios while considering long-term agricultural factors such as the evolution of pesticide resistance and impacts on ecosystem services such as population decline in the natural enemies of pests. After providing an overview of eco-efficiency, we will discuss specific applications of eco-efficiency. First, we will demonstrate the derivation of an eco-efficiency index for quantifying environment and human health benefits across various crops. Second, we will study eco-efficiency in cotton, illustrating how an ecological risk assessment can inform the conservation of natural enemies and enhance pest management efficiency. Finally, we will discuss potential policy tools for improving the eco-efficiency of pest management and promoting the adoption of IPM.

Organizer: Roger Magarey, Principal Research Scholar, Center for IPM, North Carolina State University

1:15 PM

26.1 Roger Magarey, Principal Research Scholar, Center for IPM, North Carolina State University

Introduction To Eco-Efficiency. Unlike organic or sustainable agriculture, IPM is not well recognized or understood by policymakers and the public. To address these limitations, we propose strategies to communicate, identify, quantify, track and incentivize eco-efficient (IPM) practices. Eco-efficiency includes strategies that aim to maximize benefit-cost ratios while considering long-term agricultural factors such as the evolution of pesticide resistance and impacts on ecosystem services such as population decline in the natural enemies of pests.

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1:25 PM

26.2 Madison Love, Grad Teaching & Research Assistant, NC State University.

Tracking Sustainability in Crop Pest Management in the United States Using an Eco-efficiency Index:

We propose the development of an index designed to quantify, track and incentivize IPM adoption. One method for developing such an index is the concept of eco-efficiency, defined as the ratio of productivity to environmental impacts. To demonstrate the potential utility of this index, eco-efficiency scores were calculated for ten crop groups in the United States from 1992 to 2018. These calculations incorporated data on crop production and pesticide use, factoring in both the toxicity and mass of active ingredients applied. This index offers a valuable tool for monitoring eco-efficiency progress over time and identifying priorities for IPM research and extension efforts.

Co-authors: Roger Magarey, and Danesha Seth Carley, NC State University.

1:45 PM

26.3 Peter Ellsworth, IPM Specialist & Professor, University of Arizona

Utility of Toxicological and Field Data to Guide the Implementation of Eco-efficient Pesticide Selection: A Case Study in Arizona Cotton IPM. Natural enemy data are absent in most systems, creating an obstacle to implementation of more eco-efficient IPM strategies. Ecotoxicological data are relatively abundant but their application to predict outcomes in agricultural pest management activities is limited. Can toxicologically based data guide the implementation of ecoefficient pesticide selection? A case study of cotton pest management in Arizona was used to test if toxicological risk quotients could serve as a surrogate. The statistical analysis demonstrates the opportunities provided by the approach as well as inherent limitations. Finally, the integration of both toxicological and field data in risk assessment is an essential tool for optimizing eco-efficient pesticide selection.

Co-authors: Robert Peterson, Montana State University, Thomas Chappell, TAMU and Roger Magarey, NC State University.

2:05 PM

26.4 Liz Kreick, Research Assistant Southern IPM Center, North Carolina State University

IPM, Eco-efficiency and Policy: This review explores the challenges and systemic issues surrounding pesticide use, focusing on the concept of the "Pesticide Quandary"—a social-ecological trap where the reliance on pesticides for agricultural productivity creates feedback loops of

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pesticide resistance, environmental degradation, and public health risks. Eco-efficiency is a potential solution to incentivize integrated pest management (IPM) practices, aiming to balance agricultural productivity with reduced pesticide risk. The eco-efficiency framework incorporates metrics that account for environmental and human health externalities while providing a standardized approach for pesticide risk assessment. Recommendations include the development of standardized eco-efficiency scoring, integration into decision support tools, and regulatory policies that encourage the adoption of sustainable pest management practices. This analysis underscores the importance of measurable, incentive-driven frameworks to break the negative feedback cycle of the pesticide quandary and promote long-term sustainability in agricultural systems.

Co-author: Roger Magarey, North Carolina State University

2:25 PM

25.5 Facilitated discussion - Roger Magarey, NC State University; Madison Love, NC State, University; Peter Ellsworth, University Of Arizona; Liz Kreick, NC State University.

27. Using Research to Design Wildlife Damage Management and Tick IPM Educational Programs

Breakout Topic: Urban Structural/Landscape

Location: Sunset 3

Session Abstract: Vertebrate pests, including wildlife such as rodents, birds, and reptiles, affect all of us–no matter where we live or what we do. Integrated management of vertebrate pests (IVPM) is generally overlooked as an IPM discipline partly due to the variable and isolated nature of pest infestations. However, with increased vertebrate pest/human conflicts, IVPM is needed now more than ever.

Our IPM Team is a diverse group of stakeholders engaged in bridging the gap between pesticide safety education and IPM. We assessed the needs/desires of Extension Agents and other wildlife damage management educators in U.S. states and territories to determine the content and desired format of educational resources on IVPM (720 total responses). The development and analysis of this needs assessment survey was funded by the Western IPM Center grants program.

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We will summarize the survey results and provide a status report on an online course for IVPM.

Organizer: Wayne Buhler, Pesticide Safety Education Specialist, NC State University.

1:15 PM

27.1 Wayne Buhler, Pesticide Safety Education Specialist, NC State University.

Conducting a Needs Assessment for Educators: The prevalence of human-wildlife encounters resulting in injuries or deaths, damage to structures and landscapes, and loss of crops creates an urgent need to increase the adoption of Integrated Pest Management. As "first responders" to questions from the public regarding damage caused by wildlife, Extension educators/agents need science-based information to advise their clientele. Yet, expertise in integrated wildlife damage management (IWDM) within the Land Grant system is increasingly rare, and very few Extension educators have the knowledge and tools to address appropriate practices in this very specialized area. Our Collaboration Team launched a national online survey in September 2023 to ascertain Extension educators' understanding of IWDM topics and the desired content, format, and delivery of continuing education. Based on survey responses, we intend to develop new or revised materials for Extension educators and deliver this information through online continuing education.

2:10 PM

27.2. Joellen Lampman, Community IPM Extension Support Specialist, The New York State Integrated Pest Management Program.

How to Influence the Public: Are we asking the right questions?: Tickborne diseases (TBDs) post significant public health challenges. Public health campaigns seeking to improve adoption of tick bite prevention practices among at-risk communities often use knowledge, attitudes, and practices (KAP) surveys to understand individual-level factors that influence behavioral decisions. Furthermore, grounding community assessments and interventions in theory may enhance the effectiveness of behavioral and health promotion interventions. Within this context, a collaborative team supported through the Northeast Regional Center for Excellence in Vector-Borne Diseases: Teaching & Evaluation Center reviewed the existing TBD-KAP literature to identify the degree to which existing community assessment tools align with theoretical behavior change constructs. A literature search identified 26 articles reporting TBD-KAP survey results in the US, Canada, and Europe. Individual question items from the 26 articles were extracted and mapped to theoretical constructs from the Health

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Belief Model (perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, self-efficacy) as well as acceptability, accessibility, and affordability. The constructs with the highest representation among the mapped question items included cues to action, acceptability, perceived benefits, and perceived susceptibility. The constructs with the least representation included self-efficacy, accessibility, and perceived barriers. These results highlight a focus of the existing KAP-TBD literature on measuring community TBD awareness and risk perceptions, with major gaps in the measurement of barriers to adoption of tick bite prevention behaviors. The development of KAP tools to address these gaps can aid public health programs in the development of holistic programs that are responsive to their communities.

2:30 PM

27.3. Megan Kruger, Evaluation and Research Specialist, West Virginia University.

Turning Results into Plans: A needs assessment is a systematic process of gathering information. It is a critical tool for designing programs and initiatives that effectively address the needs of communities or target populations, especially when developing a new program. When utilized, needs assessment data can provide essential information to guide data-driven decisions that allow programs or initiatives to effectively address the actual or perceived gaps in knowledge, resources, or services. However, translating needs assessment results into actionable strategies can be neglected due to limited time, data interpretation expertise, or challenges integrating findings into strategic planning. This session explores the practical application of needs assessment results in designing and implementing educational programs for wildlife damage management. We will demonstrate how to move from survey results to action by utilizing participatory evaluation methods and data-driven strategic planning. Attendees will learn to incorporate research/needs assessment findings into strategic planning, develop competitive grant proposals, and create community-relevant educational programs. This case study will illustrate the successful integration of needs assessments into program design, highlighting strategies for overcoming common barriers. Participants will leave with a deeper understanding of using social science data to align programmatic goals with stakeholder needs, ensuring that programs are impactful, and data driven. This session will empower practitioners to transform their human dimensions or social sciences research into actionable plans, advancing behavior change and efficacy in integrated pest management and beyond.

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28. School & Community IPM How Do We Make This a Success?

Breakout Topic: Public Health

Location: Sunset 1 & 2

Session Abstract: This Session will bring together how school IPM programs have fared since the 9th International IPM Symposium on sinking ships or soaring success. Even when states of mandates for IPM in schools is it really working? Yet there are pockets of success even when there has been reduced funding in this area. How do master volunteers and county agents play a role in educating the public. Finally, we will present a report on the National Strategic Plan for Community IPM about what our next steps are.

Organizer: Janet Hurley, Senior Extension Program Specialist IPM, Texas A&M University, USA

1:15 PM

28.1 Dawn Gouge, Specialist, Public Health IPM Medical Entomology Professor, University of Arizona, USA; **Tim Stock,** School IPM Program Director, Oregon State University, USA

Master Wellness Volunteers Programs and Pest Management: One Health initiatives into the health and wellness curriculum of new Master Wellness Volunteer programs is on the rise. This adult volunteer program includes recruitment and training of volunteers on climate science, health, and the intersection of each along with the key concepts of One health as well as more typical Master Wellness topics including nutritional science, food safety, healthy lifestyle habits, and well-established social determinants of health.

This untapped audience can help grow a much-needed outreach to help disseminate information on IPM and how pest management contributes to food borne illnesses.

1:33 PM

28.2 Jody Gangloff- Kauffman, Senior Extension Associate, New York State IPM Program, Cornell University, USA

Are School IPM Working Groups Obsolete?: This session will examine the impact that the last remaining regional school IPM working group has had, including accomplishments like the "School IPM Best Practices website" and cooperative efforts with outside agencies. We will examine barriers to making progress and opportunities for future work based on a priorities survey conducted in 2020.

Hot Topic Key

 = Climate Change  = Invasive Species  = Vectors/Pathogens  = Biocontrol/New Tech  = Pesticide Resistance

1:51 PM

28.3 Keawe Molifua, Pesticide Investigator, Oregon Department of Agriculture, USA

Implementation of School IPM Law: A Case Study: This session will provide an overview of the Oregon school IPM law and compliance examples. We will discuss the combined work of the Oregon Department of Agriculture's regulatory and outreach efforts with Oregon State University's educational contributions, and how this results in increased compliance with the law and decreased pesticide use long-term.

2:09 PM

28.4 Tim Stock, School IPM Program Director, Oregon State University, USA

How a Statewide School IPM Program was Developed: The Oregon State University School IPM Program has been in existence since 2007. This presentation will describe the participatory and integrative process the School IPM Program developed in its' efforts towards a sustainable and continual improvement of pest management in Oregon's schools. This will include challenges, successes, lessons learned and future possibilities.

2:27 PM

28.5 Janet Hurley, Senior Extension Program Specialist IPM, Texas A&M University, USA

School and Community IPM- Why We Need Inclusion in the Farm Bill: This session will report on what is contained in the National Strategic Plan for Structural Pest Management. We will cover what stakeholders feel are our greatest challenges for the next four years and how we involve our local, state and national legislators and leaders to understand the importance of IPM now.

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29. Tools and Approaches for Controlling Invasive Pests in Changing Environments

Breakout Topic: Cross-Disciplinary

Location: Sunset 4

Session Abstract: The objective of this session is to raise awareness about decision-support tools and products that may enhance the detection and control of invasive pests in changing environments, such as predictive models, web-based infrastructure, data products, and automated monitoring systems. Additionally, outreach and educational strategies for enhancing the uptake of tools and products by end users will be addressed.

Hot Topic Key

= Climate Change = Invasive Species = Vectors/Pathogens = Biocontrol/New Tech = Pesticide Resistance

Networking among speakers and the audience during the symposium will encourage collaboration on research projects and outreach programs, as well as the development of proposals for competitive grant programs. Ultimately, products resulting from these collaborations may increase the effectiveness of surveillance and management programs for invasive pests.

Organizer: Brittany S. Barker, Assistant Research Professor, Oregon IPM Center and Department of Horticulture, Oregon State University, USA; Silvia Rondon, Director- OIPMC, Oregon State University

1:15 PM

29.1 Brittany S. Barker, Assistant Research Professor, Oregon IPM Center and Department of Horticulture, Oregon State University, USA

A Platform for Predicting Climate Change Effects on Invasive Pests I: Climate Suitability Focus: Tools and approaches for assessing the risk posed by invasive pests in rapidly changing climates are urgently needed. The USPest.org decision-support system, hosted by the Oregon IPM Center at Oregon State University, maintains a suite of predictive models to help understand regional and national risks posed by pests in the United States. This presentation will focus on spatial models developed for the DDRP (Degree-Days, Risk and Phenological event maps) platform, which produce forecasts of the risk of invasive insects being present and their seasonal development where climates are suitable for establishment. Short-term forecasts for 18 invasive pests for the contiguous United States (CONUS) are updated every 2-3 days at USPest.org (see https://uspest.org/CAPS). Additionally, forecasts for select species including the spotted lanternfly (*Lycorma delicatula* White) and emerald ash borer (*Agrilus planipennis* Fairmaire), are delivered in a range of user-friendly, readily accessible formats at the USA National Phenology Network (https://www.usanpn.org/data/forecasts).

This presentation will focus on DDRP's capabilities to forecast climate-based establishment risk for pests under contemporary and future climate climates. We demonstrate how time-series analyses of DDRP predictions may provide insight into changes in establishment risk driven by contemporary climate change. Latitudinal and elevational range expansions into cooler areas of CONUS are predicted for most target pests under long-term climate projections (e.g., 2040, 2060, etc.); however, some species also experience range contractions in hot regions.

Authors: Brittany S. Barker and Leonard Coop

1:45 PM

29.2 Leonard Coop, Associate Professor (Practice), Oregon IPM Center and

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Department of Horticulture, Oregon State University, USA

A Platform for Predicting Climate Change Effects on Invasive Pests II. Phenology focus: In our introduction to the DDRP (Degree-Days, Risk and Phenological event maps) platform, which combines climate suitability and phenological modeling, we continue with a focus on the latter. We can use DDRP to predict how climate change influences phenological events. We will highlight examples whereby invasive pests are expected to emerge earlier and complete more generations per year over multiple decades of climate change. Additionally, we introduce open-access online tools that can be used to examine phenological changes for 18 high-priority invasive insects and to develop custom models in which users enter their own degree-day modeling parameters. Thus, the new DDRP tool set combines two important aspects of pest population dynamics: the simultaneous examination of both when and where pests are expected to appear, in the past, present, and in the future under different climate change scenarios.

Authors: Leonard Coop, Brittany S. Barker

2:00 PM

29.3 Pankaj Chouhan, Associate Postdoc, Center for Ocean-Atmospheric Prediction Studies, Florida State University, USA

Predicting Suitable Habitats for Pest Insects in the Continental US Under Current and Future Climate Conditions Using Maxent: The spread of pest insect species presents significant challenges to agriculture, forestry, and biodiversity. Food and Agriculture Organization of the United Nations estimates that pests are responsible for 20–40% of global crop losses annually, valued at over $290 billion. It is essential for proactive management to understand where these pests are likely to spread in the future and how climate change could impact their distribution.

In this study, we used Maxent, a machine learning-based species distribution modeling tool, to predict the suitable habitats of four key pest insect species in the continental United States: Brown Marmorated Stink Bug (*Halyomorpha halys*), Corn Earworm (*Helicoverpa zea*), Large Lady Beetle (*Harmonia axyridis*), and Root Weevil (*Diaprepes abbreviatus*). Our models combine pest occurrence records with crop data, bioclimatic variables, and land use harmonization data to estimate current distributions and project future changes under different greenhouse gas emission scenarios.

The results identify regions

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vulnerable to pest establishment and highlight how suitable habitats may shift in response to climate change. We also examine the key factors driving these shifts and emphasize the importance of careful model design, particularly the selection of background points, as Maxent outputs can be sensitive to such choices.

Our findings support the need to integrate future climate scenarios into pest management strategies, providing actionable insights to enhance agricultural resilience and ecological sustainability.

Authors: Pankaj Zhouhan, Olmo Zavala
2:15 PM

29.4 Joaquin Guillermo Ramirez Gil, Associate Professor, Universidad Nacional de Colombia, Sede Bogotá Facultad de Ciencias Agrarias, Departamento de Agronomía, Laboratorio de Agrocomputación y Análisis Epidemiológico

Forecasting Potato Diseases Using Multi-Approach Models and Digital Strategies as a Basis for Evidence-Based Phytosanitary Decision-Making in the Colombian Tropics: Potato cultivation in Colombia is of critical importance, not only due to the employment it generates but also for its role in food sovereignty and security. However, this production system currently faces numerous phytosanitary challenges that threaten its sustainability.

The present study proposes a multi-approach modeling framework combining frequentist statistics, Bayesian methods, compartmental mathematical models, and artificial intelligence tools to analyze the spatiotemporal dynamics of major potato diseases. Special emphasis is placed on the quarantine problem of "Purple Top" disease and its vector, *Bactericera cockerelli*. The proposed models integrate information associated with climate uncertainty, accounting for variability and climate change scenarios. These predictive models provide essential insights into the dynamics of disease spread, potential impact, and effective management strategies. Furthermore, the models are incorporated into a digital platform designed to facilitate access to this information for farmers. By enabling risk analysis, the platform serves as a decision-support system, empowering farmers to make informed choices regarding disease management and mitigation strategies.

Our work not only delivers a robust evidence-based framework for decision-making but also ensures its practical application through open-access digital tools. This approach bridges the gap between advanced scientific modeling and its real-world application in agricultural practices. By providing farmers with accessible and actionable information, this initiative aims to enhance the management of potato diseases, reduce risks, and promote the long-term sustainability of

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potato cultivation in Colombia. The integration of climate data further strengthens the platform's ability to adapt to current and future challenges in potato production systems.

Authors: Laura A. Valbuena Gaona[1], Eliecer Diaz Almanza[2], William Fernando Cárdenas[1], William León[3], Joaquín Guillermo Ramírez Gil[1]

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[3]Federación de productores de papa - Fondo Nacional de Fomento de la papa

2:30 PM

29.5 Gengping Zhu, Research Assistant Professor, Department of Entomology, Washington State University, USA

Enhancing Monitoring to Promote Early Detection and Eradication of Invasive Species: Habitat suitability predictions, which could be attained via correlative and mechanistic ecological niche models, are widely used in invasion risk assessment, by predicting the distribution of invasive species before or after they have been detected in new regions. Such models should also be used to guide surveys to promote the early detection and eradication of invasive species.

Here we propose a practical framework that seamlessly uses ecological niche models to develop sampling routes that promote detection of invasive species. Our framework uses habitat suitability predictions and occurrence data on incursion populations to generate potential survey sites, which are then prioritized for sampling based on their size and suitability. The generated survey route is then displayed on an open street map platform. Our framework was developed into the 'enmRoute' R package (https://github.com/gpzhu/enmRoute) and a user-friendly website (https://losorio.shinyapps.io/enmroute) to facilitate its application.

The session will demonstrate how our platform integrates ecological niche models with human transport routes to promote identification of survey sites that are predicted to collect more individuals. Our framework may help industries, invasion biologists, and regulators develop economical and efficient survey programs for invasive pest monitoring that make eradication programs more attainable.

3:00 PM

29.6 Kyle Birchard, Founder/CEO, Resight Laboratories, Inc. Portland, Oregon, USA

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The Role of Sensemaking Tools in Supporting IPM Practice: A model for Pest Monitoring Collaboration with New Remote Sensing Technologies: Agricultural landscapes may consist of thousands of individual decision makers whose actions can affect pest populations. This poses a unique problem in that mobile species, such as insect pests, disperse irrespective of management units such as property boundaries. The fragmented nature of crop management can produce spatial externalities, where activities in one location affect neighboring parcels. These impacts may be negative, for example, if a poorly managed or unmanaged orchard serves as a source for pests. Conversely, good management practices may produce benefits that spill over onto neighboring parcels, but go unmeasured, which can hinder broader adoption of these practices.

Common awareness of the status of mobile species in a landscape can provide widespread benefits to decision makers, but information is rarely communicated from neighbor to neighbor in a way that results in coordinated action. Overcoming barriers to sharing information about site conditions could support greater coordination of activities and improve the effectiveness of IPM methods at a landscape scale.

Challenges include a lack of legal and institutional frameworks for collaborative data collection and use, and disparate protocols for data quality and interoperability. The opportunities afforded by a new generation of technical infrastructure (including hardware, communications networks, and scientific computing) must overcome these challenges.

This talk will discuss the potential of new hard technologies to support the development of regional pest monitoring collaboratives that combine traditional trapping and scouting efforts with optical and radar instrumentation, delivered to IPM practitioners in the form of real time spatial visualizations and forecast data products.

3:15 PM

29.7 Tim Warren, Assistant Professor, Department of Horticulture, Oregon State University, USA

Rapid, Long-distance Flight Dispersal in Spotted-wing Drosophila: The effective management of insect pests depends on understanding their movement at a landscape scale. Many small insects are thought to lack the capacity for long-distance navigation, yet it is commonly observed that they reliably re-establish in areas that are seasonally inhospitable. For *Drosophila suzukii* (spotted-wing drosophila), this seasonal re-establishment could occur through flies

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finding local refuge. An alternative possibility, however, is that *D. suzukii* can establish new territory via long-distance dispersal. We developed a system to continuously track the flight trajectories of *D. suzukii* relative to an overhead light cue mimicking the sun. We found that both male and female flies maintained remarkably straight flight headings -- that varied unpredictably across individuals. In complementary experiments, we measured the dispersal of *D. suzukii* directly by releasing thousands of flies and tracking their arrival across a grid of computerized camera traps. Flies dispersed radially 100 m in several minutes -- raising the possibility that individual *D. suzukii* could travel several kilometers in a day. Our results suggest that *D. suzukii* has an underappreciated capacity for long-distance dispersal -- which may contribute to its invasiveness and seasonal re-establishment in inhospitable climates.

3:30 PM

29.8 Jessica Green, Senior Faculty Research Assistant I, Oregon IPM Center and Department of Horticulture, Oregon State University, USA

Connecting the Dots: The Use of Field-Collected Data and Phenology Models to Aid Decision-making: Timely monitoring and reporting of critical pests is an integral component of effective integrated pest management (IPM). Pest monitoring supports decision making and helps to minimize crop damage and reduce additional economic and environmental costs of ineffective or poorly timed pesticide applications. Still, it is resource-intensive and requires knowledge of the seasonal development of pests.

A new, interactive digital information dashboard, the Oregon Pest Monitoring Network, helps to broaden the utility of collected data and display it in an intuitive way. Users can select filters to narrow down crops or pests of interest and view activity trends. New developments include integration with established phenology models and predictive tools. Rapid data acquisition of complementary datasets can be combined with pest survey data from commercial fields, to develop phenology and forecast models of pest infestation risk based on significant environmental predictors.

3:45 PM

29.9 Keith Mason, Program Coordinator, Michigan State University Enviroweather, USA

Working with Stakeholders to Provide Tools for the Management of Spotted Wing Drosophila in Michigan: Michigan State University's Enviroweather is the agriculturally focused weather network in Michigan. Data are collected from 113 weather stations, and data are used to create weather summaries and crop-specific tools to help Michigan agricultural producers and resource managers make management decisions. Enviroweather works closely with stakeholders of plant-based industries to

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fulfill critical needs including threats from emerging pests and diseases.

This presentation provides an example of how a multidisciplinary team composed of members from the Michigan State University Department of Entomology, MSU Extension, MSU Enviroweather and key industry stakeholders collaborated to develop a model to help cherry growers manage a key invasive fruit pest, the spotted wing *Drosophila* (SWD). The model combines multiple factors that come into play for managing this pest; insecticide efficacy after rainfall, fruit susceptibility to infestation, and pest and crop phenologies (the weather-driven seasonal patterns of activity and population development).

The SWD Control Model can be accessed on the MSU Enviroweather website: https://enviroweather.msu.edu/crops/cherry/spottedwingdrosophila. Tar cherry bloom date starts the model, which estimates the risk of infestation based on crop development. In addition, the model estimates the efficacy of an insecticide considering recent precipitation. This informs the user whether additional pesticide application is warranted. This model will benefit growers through improved management of this key pest, better fruit quality at harvest, and reducing insecticide applications during periods when the pest is not present or the fruit are not susceptible to damage, or if sufficient insecticide remains on the fruit to prevent SWD infestation.

4:00 PM

29.10 Joseph LaForest, Public Service Associate, Entomology Center for Invasive Species and Ecosystem Health, University of Georgia, USA

Ready-to-use Tools to Empower Data Driven Pest Management and Area-wide Collaboration: Area-wide pest management requires effective and consistent communication between all partners. This is especially true when a new invasive species is introduced with impacts on many different commodities and environments.

The Early Detection and Distribution Mapping System (EDDMapS) was created to coordinate data between disparate groups working on the same species in different systems. It provides an effective toolset for data collection and management, decision support, visualizations, and alerting. Through funding provided by USDA NIFA's Crop Protection and Pest Management Regional Coordination Program, the existing tools are available at no cost to any group in the United States. Additional functionality developed for other projects further expands the suite of tools that are available to all. This presentation gives an overview of the available tools and provides several examples of coordination enabled by sharing of data between programs.

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29.11 Allan Fabricio Pinto Padilla, Research Associate, Cornell University, USA

Evaluating the Cost-Benefit of Spotted Lanternfly (*Lycorma delicatula*, Hemiptera: Fulgoridae) Management Strategies in New York Grape Production: The Spotted Lanternfly (SLF), native to Asia, seriously threatens over 100 U.S. plant species, including grapes. SLF has rapidly spread since its detection in Pennsylvania in 2014, causing substantial economic and agricultural losses. Pennsylvania grape growers faced severe early impacts, including vine death and replanting, highlighting the pest's destructive potential. As of early 2024, New York State (NYS) grape growers had not reported SLF-related damage, but the pest's confirmation in the Finger Lakes region in July 2024 raised significant concerns. Fortunately, advancements in management strategies—such as exclusion netting, targeted pesticide applications, biological control, and monitoring—provide growers with practical tools to combat SLF. Without intervention, economic losses in NYS grape production are estimated at $1.5 million, $4 million, and $8.8 million in the first, second, and third years of infestation, respectively. This study evaluates economic thresholds and conducts a cost-benefit analysis of these management strategies, emphasizing the importance of proactive measures to mitigate SLF's impact. The findings highlight the need for timely adoption of effective practices to safeguard NYS grape production and reduce SLF-related risks.

Authors: Flor E. Acevedo[3], Brian C. Eshenaur[2], Michela Centinari[3], Alejandro A. Calixto[2], and Miguel I. Gómez [1]

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30. Harnessing the Power of IPM to Manage Invasive Tree Pests in Southern California

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: Southern California enjoys a broad array of native, landscape and agricultural trees that provide significant cultural, economic, health, and ecosystem service benefits. Yet, those trees are under constant threat from invasive insects that thrive in the region due to the idyllic climate and lack of natural enemies. This session will examine some of the most serious tree pests impacting the region and how the application of an integrated pest

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management approach is helping to control them.

Presenters will discuss current best management practices, classic biological control methods, and innovative approaches currently being researched.

Organizer: Randall Oliver, ISHB Communications Coordinator, UC Agriculture and Natural Resources

3:00 PM

30.1 Beatriz Nobua-Behrmann, Ph.D., Urban Forestry and Natural Resources Advisor, University of California Cooperative Extension, Los Angeles and Orange County, USA

Invasive Shothole Borers (ISHB) are tiny beetles that bore into trees and infect them with a fungus that causes the disease Fusarium dieback. More than 65 species of trees found in Southern California are hosts for this pest. Two species of ISHB have established across seven counties in Southern California over the last two decades, and in late 2023 one of those species was found in Santa Clara County in Northern California. A third species that is new to California was recently found in Santa Cruz County.

This session will cover the following:
1) Invasive Shothole Borers: biology, range, and identification
    a. How to identify ISHB
    b. Common hosts and signs and symptoms of damage
    c. Discussion of current pest status in California including recent Bay Area detections
    d. Threat map – areas potentially at risk
2) ISHB management
    a. Surveying and trapping procedures and monitoring
    b. Insecticides that have been found to be effective and biological control
    c. Overall IPM plan for pest
    d. Where to report detections
3) New hope on the horizon – endophytes and bio controls

3:30 PM

30.2 Joelene Tamm, Natural Resources Director, La Jolla Band of Luiseno Indians and Master's Student, University of California, Riverside, USA

Gold-spotted Oak Borer (GSOB) is an invasive borer beetle that attacks and kills mature oak trees. Over the last decade, GSOB has killed more than 200,000 oak trees in San Diego County and has since spread to Riverside, Orange, Los Angeles, San Bernardino and, most recently, Ventura Counties in Southern California. GSOB's spread is primarily through movement of infested firewood.

This session will cover the following:
1) GSOB ID, biology, signs, symptoms, distribution
2) Prevention, management of infested wood

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3) Field identification, reporting, specimen sampling, photographs (scale), GPS
4) Best management practices to limit spread
5) Current Management options, insecticides (options and timing), removal of amplifier trees.
6) Forest health, three cut method for pruning, and safety considerations
7) Surveying techniques, Tree health surveys, ArcGIS, Multispectral Drone
8) Case study
9) Client outreach, collaboration

4:00 PM

30.3 Eric Middleton, Ph.D., Area IPM Advisor, University of California Cooperative Extension, San Diego County, USA

South American Palm Weevil (SAPW) is an invasive beetle that is attacking several palm species in San Diego County. SAPW has the potential to cause significant damage to native and non-native palms in California. The ornamental palm industry has an estimated value of $70 million while commercial date producers in the Coachella and Imperial Valleys contribute about $30 million to California's economy.

This session will cover the following:

1) Overview of biology and invasion history of SAPW in California
2) SAPW Identification and other diseases and disorders that Can Mimic SAPW
3) Current best management practices for SAPW
4) Update on SAPW insecticide trials and trap and kill method
5) Removal and disposal of infested palms
6) Orange County working group for rapid response to possible arrival of SAPW

Session Organizer: Randall Oliver, ISHB Communications Coordinator, University of California Agriculture and Natural Resources

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31. From Plan to Practice: Sustainable Pest Management and the Protection of Endangered Species

Breakout Topic: Communications & Outreach

Location: Dockside

Session Abstract: This session brings together two critical topics at the intersection of environmental protection: pest management and endangered species conservation.

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The first talk, "A Sustainable Future in Pest Management," will focus on California's Sustainable Pest Management (SPM) Roadmap. Dr. Sapna Thottathil will explore the evolution of SPM in California, its relationship to integrated pest management, and its impacts on agricultural and urban pest management practices. The session will delve into the State's collaborative approach to SPM and address measures being taken to achieve a transition to more sustainable pest management practices, including how the state protects endangered species in relation to pesticide use.

The second talk, "EPA Workplan for Protecting Threatened and Endangered Species," will highlight the US Environmental Protection Agency's (EPA) efforts to better align its pesticide regulatory practices with the requirements of the Endangered Species Act (ESA). Dr. Al Fournier will discuss the 2022 Endangered Species Act Work Plan, focusing on strategies to assess and mitigate risks to listed endangered species. This session will trace the EPA's evolving approach to ESA compliance, detailing how new approaches and input from the public have shaped the agency's efforts to maximize conservation outcomes while maintaining flexibility for producers.

Together, these sessions will provide a comprehensive overview of ongoing efforts to promote sustainable pest management and protect biodiversity at both the state and federal level.

3:00 PM

31.1 Sapna Thottathil,
Deputy Director, Sustainable Pest Management, California Department of Pesticide Regulation, USA

A Sustainable Future for Pest Management in California: In 2023, the Department of Pesticide Regulation (DPR), California Environmental Protection Agency, and California Department of Food and Agriculture released a Sustainable Pest Management (SPM) Roadmap for California. Developed by a cross-sector work group representing diverse interests, the Roadmap charts a course for the state's transition to SPM in agricultural and urban settings. Since then, the state legislature has been supporting and investing in the state's transition to SPM, including defining what SPM is under AB 2113 and the Food and Agricultural Code. Additionally, DPR has been implementing many recommendations from the Roadmap to reach two high-level goals for the year 2050: 1. Eliminating high-risk pesticides, called Priority Pesticides, by transitioning to more sustainable pest management practices, and 2. Making sustainable pest management the everyday way of managing pests for everyone, across all settings and industries.

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Dr. Sapna Thottathil will discuss the SPM Roadmap in detail, how SPM builds on the concept and practice of Integrated Pest Management (IPM) and land stewardship, and pest management challenges facing agriculture, natural lands, and urban areas throughout California. She will also discuss DPR's progress to date on supporting SPM, including improving registration and evaluation, exploring biopesticides, developing a pesticide prioritization process, convening a cross-agency Work Group, and funding an increasing number of research and implementation grants focused on IPM best practices and alternatives.

3:45 PM

31.2 Al Fournier,
Fournier@cals.arizona.edu, Associate Director, Arizona Pest Management Center, University of Arizona, USA

EPA Workplan for Protecting Threatened and Endangered Species: The Endangered Species Act (ESA) has been in place since 1973. However, the Environmental Protection Agency (EPA) has often been challenged in court for failing to uphold the requirements of ESA. There are many complicated reasons for this. In 2022, EPA published its Endangered Species Act Workplan Update, broadly outlining a new approach to help ensure that EPA's future pesticide actions will be compliant with its Endangered Species Act obligations. Dr Fournier will highlight elements of the new ESA workplan, which initially focuses on agricultural pesticide use. He will also describe how EPA's "Strategies," such as the Herbicide Strategy, identify potential adverse impacts on populations of listed species and then develop pesticide use mitigation options to address these risks. This proactive approach is influenced with input from growers and other stakeholders through the public commenting process. The talk will trace the evolution of EPA's approach to addressing endangered species protections and will highlight the influence of public comments. Additionally, we will provide examples of EPA's mitigations addressing risks from spray drift and pesticide runoff in agricultural settings and discuss EPA's approach to addressing geographic-specific protections for listed species, with a focus on California species.

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32. Status and Control of Spodoptera Frugiperda (J.E. Smith) on Maize in Kolhapur District of Maharashtra, India

Break Topic: Agriculture (Row/Field Crops)

Location: Garden Room

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Organizer: A.D. Jadhav, Department of Entomology, BV's Loknete Mohanrao Kadam College of Agriculture & College of Horticulture, India

3:00 PM

32.1 Jadhav A.D., Department of Entomology, BV's Loknete Mohanrao Kadam College of Agriculture & College of Horticulture, India, dradjadhav@yahoo.co.in

Session Abstract: The *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) is a major pest of maize. It is polyphagous in nature and highly migratory. An investigation was conducted in selected talukas viz., Karveer, Gadhinglaj, Panhala, Radhanagari and Hatkanangale from Kolhapur district, Maharashtra Province India, in the maize growing areas for the survey and surveillance study of *Spodoptera frugiperda* (fall armyworm). The study was carried out for two consecutive years i.e., 2019-2020 and 2020-21 during cropping seasons viz., winter 2019, summer 2020, and early winter 2020, winter 2020 , summer 2021, and early winter 2021.

The investigation revealed that among the selected talukas by comparing all the seasons, the highest larval population (1.13 larva/plant) was observed in the winter season of the year 2020-21 on the 46th SMW (November 2020) in the Hatkanangale taluka of Kolhapur district. However, the lowest larval population was observed in Panhala taluka (0.07 larva/plant) on 31st SMW (August 2021). The maximum incidence of the pest was noticed in winter season maize plantation. The highest larval load was detected during the vegetative stage of maize i.e. whorl stage whereas it was noticed lowest in reproductive stage of the crop. Details about the integrated pest management practices, extension work being carried out to educate academicians, farmers, extension functionaries to control pest are discussed in detail in the paper.

Co-Authors: Jadhav S.S.** Jadhav,A.A.*** and Kamble ,Vinit****

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****Department of Zoology, Shivaji University , Kolhapur, India

3:30 PM

32.2 Jadhav A.D., Department of Entomology, BV's Loknete Mohanrao Kadam College of Agriculture & College of Horticulture, India, dradjadhav@yahoo.co.in

Incidence of Campoletis chlorideae Uchida (Hymenoptera: Ichneumonidae) on Spodoptera frugiperda (J. E. Smith): Campoletis chlorideae Uchida is a renowned biocontrol agent for Helicoverpa armigera (Hubner) and other lepidopteran insects.

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It has also been observed to parasitize Spodoptera frugiperda (J. E. Smith).

A study was conducted in Karveer taluka of Kolhapur district, Maharashtra, India across the winter season (2018), summer season (2019), and monsoon season (2019) to assess the prevalence of Campoletis chlorideae in maize. During the winter season of 2018, the highest percentage of parasitism (91.78%) was recorded on the 47th SMW in November 2018. In the summer season of 2019, the highest percentage of parasitism (64.38%) was observed on the 9th SMW in March 2019. The highest level of parasitism, reaching 85.11%, was recorded on the 29th SMW (July 2019) during the monsoon season of 2019.

The level of parasitism exhibited a significant correlation with both the maximum and minimum relative humidity, showing a positive correlation. Conversely, a significant inverse relationship was observed with the maximum temperature.

4:00 PM

32.3 Miss Ashwini Adhikrao, Researcher, RUSA Centre for Food Product Development (CFPD), S.N.D.T Women's University, Mumbai, India, ashwini.j476@gmail.com

Opportunities for innovations, technology development in mulberry value-added food products and pest management: There are ample opportunities in innovations and technology development in silk and sericulture resources . Mulberry is the sole food of silkworm B.mori hence it is cultivated extensively by the farmers. Mulberry has high potential for value addition and for development of chain of products. Mulberry is easy to grow, has high biomass production in the shortest time, easily produces biomaterials, and is cultivated in large areas in India.

During the years 2022-23 about 253125 hectors mulberry area was under cultivation. Hence, a raw material is available on large scale as conducive environmental conditions are persisting in India to grow mulberry extensively. It is well established fact that Mulberry has high GABA & 1 DNJ content, it has Anti-diabetic, Anti- hypertension, Anti-cholesterol, Anti-ageing, properties as well as high proteins, mineral and vitamins content. and no caffein . Hence, mulberry can be used in various innovations to develop products useful in animal and human welfare and health benefits too.

We have successfully demonstrated sustainable technologies for commercial products out of mulberry. However, there are many constraints to produce quality mulberry leaves for process of value-added products particularly infestation of various pests. Therefore, attention was given to foliar pests. Survey was carried out for two years (2022-2023)

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with local farmers to know status of promising mulberry leaf pests. It was noticed that about 20 to 30 leaf production and quality was affected due to various foliar pests. To get quality foliage and develop international quality mulberry value-added products IPM practice are highly required. There are equal beginnings for food technologists, entomologists, physicists, chemical and biotechnologists to have interdisciplinary research work in this area. Details are discussed in the paper.

33. The Emergence of Botanical and 25(b) Products in Urban Pest Control: Challenges and Future Integration in IPM

Breakout Topic: Urban Structural/Landscape

Location: Sunset 3

Session Abstract: The growing use of 25(b) exempt products and botanical insecticides in urban pest control reflects a shift toward safer, environmentally friendly options within Integrated Pest Management (IPM). However, pest control professionals face significant challenges in implementing these products, including varying efficacy, limited residual activity, and the need for precise application techniques. Despite these obstacles, the increasing regulatory pressures and rising customer demand for softer and environmentally smart pest control solutions make integrating 25(b) and botanical products an essential part of urban pest management. This session discusses the current challenges and underscores the importance of adapting IPM strategies to incorporate these emerging tools, ensuring sustainable and effective pest control in an evolving regulatory environment.

The goal is to bring awareness to the growing use of botanical and 25(b) products in urban pest control, highlighting their unique benefits and challenges. This discussion will explore how these natural alternatives are reshaping Integrated Pest Management (IPM) strategies and their potential for future integration. The objectives are to educate and engage the audience, with participants stopping by the booth for further discussion and to explore practical applications.

Interactive presentation with Q&A

Organizer: Chris Swain, Director of Technical Services, MGK; Ryan Neff, West Coast Technical Field Specialist, MGK

3:00 PM

33.1 John Buenneke, Botanical and International Business Director, MGK

The Emergence of Botanical and 25b Products

3:25 PM

33.2 Thomas Powell, Technical Field Specialist, MGK

IPM strategies in Urban Environments

3:50 PM

33.3 Correy Hildebrand, Technical Field Specialist, MGK

Environmentally Smart Solutions Continuum

4:15 PM

Audience and Presenter Q & A

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34. Integrated Pest Management as a One Health Strategy to Address Human Burden of Vector-Borne Diseases

Breakout Topic: Public Health

Location: Sunset 1 & 2

Session Abstract: Integrated pest management (IPM) is an evidence-based approach to successfully and responsibly target pest control interventions based on a vector's life cycle and environment. In this session, talks will discuss how to bring research to the market within the vector and vector-borne disease IPM space. Experts are from industries that target the tick and mosquito vectors and provide novel products for public health officials and applicators with the goal of providing solutions that target vector-borne disease burden.

Organizer: Russell John Brooke PhD, Director of Data & Analytics, US Biologic

3:00 PM

34.1 Michelle Bui PhD, Synvect, Inc.

Developing and Implementing Novel Genetic Tools for Safe and Efficacious Biological Mosquito Control: The global mosquito burden across all species is expected to broaden due to the effects of climate change, insecticide resistance, and globalization. Current conventional approaches to suppress mosquito-borne diseases, such as insecticide use, radiation-based SIT, and WIIT have been seen as impractical, ineffective, or expensive. Significant challenges to these approaches include a need for more efficient sex-sorting, economic efficiency, and suppression efficacy. To resolve these challenges, Synvect has developed two tools: SEPARATOR, a simple and efficient fluorescence-based sex sorting tool able to be applied to improve numerous current control strategies, and ngSIT, which combines the safety of SIT technology with the precision and efficacy

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of CRISPR gene knockouts and are in the process of pushing them into commercial use.

3:15 PM

34.2 Russell John Brooke PhD, Director of Data & Analytics, US Biologic

Keynote Hot Topic Talk Emerging Vectors & Vector-Borne Pathogens

Launching a Biotechnology Product: Development Through Licensure: Every commercial success is based on good research. It takes time and effort to bring an idea or finding to fruition, and with regulated products, regulatory compliance. This talk will discuss the creation of a biotechnology company and what product development involves from a science perspective going through the regulatory licensure process. The goal is to briefly describe a licensure strategy as well as building a biotechnology company's necessary processes and procedures for regulatory licensure and compliance.

3:30 PM

34.3 Thuy-vi Thi Nguyen PhD, Georgia Department of Public Health, USA

Public Health Entomology's Evolving Role in Emergency Preparedness in Mosquito Control: Onsite assessments for mosquito larval habitat sites are critical after a hurricane makes landfall. Uncertain hurricane paths and lacking forward assessment activities combined with damage to critical infrastructure represent major challenges for the Health Strike Team members to prioritize areas for public health responses.

This talk will cover lessons learned from Hurricane Irma (2017) that helped improve vector control and vector surveillance responses to Hurricane Michael (2018) to strategically place decentralized mobile surveillance units for assessing and responding to public health threats after hurricanes. The lessons learned by the Georgia Department of Public Health Environmental Health section is valuable for rapid response Environmental Health Strike Teams targeting areas of high risk and prioritize limited resources during a water-related disaster.

3:45 PM

34.4 Peter Werts, Department Director, Specialty Crops and Sustainable Communities, IPM Institute, USA

IPM Vector and Vector-Borne Interventions: From Academia to Implementation: The Tick IPM Working Group's goal is to share and expand knowledge on ticks and tick-borne diseases through monthly educational webinars, distributing and developing resources, and hosting the annual virtual Tick Academy. The working group currently consists of over 250 tick and tick-borne disease experts from across the United States. The IPM Institute's role is to connect these experts from various industries and co-facilitate a platform for dissemination of information. This session will focus on Tick IPM Working Group

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goals and the importance of collaboration and practiced facilitation in integrated pest management and public health education.

4:00 PM

Panel Discussion (20 mins)

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35. Harnessing Biodiversity to Strengthen IPM Programs in Landscapes

Breakout Session:
Horticulture/Specialty Crops

Location: Sunset 5

3:00 PM

Organizer: Adam Dale, Associate Chair for Extension Associate Professor Turfgrass and Ornamental Entomology, University of Florida, USA

35.1 Clinton Pilcher, Global Technical Education Team Lead, Corteva Agriscience, USA

Understanding the Benefits of Deploying Appropriate IPM Weed Management Programs: Our history is rich with examples of weeds developing resistance to herbicides. We continue to learn about the biology of these systems and potential management tactics that should delay the onset of weed resistance development. However, socio-economic factors are often not considered to the degree needed to ensure adoption of weed resistance management strategies. This talk will briefly discuss some historical research modeling work that evaluates different industry deployment scenarios to determine the most profitable outcomes for growers. Results would support current diversified weed management programs that uphold regulatory requirements while providing environmental benefits.

3:30 PM

35.2 Adam Dale, Associate Chair for Extension Associate Professor Turfgrass and Ornamental Entomology, University of Florida, USA

Integrating Pest Management and Biodiversity Conservation in Residential Landscapes: Urban and residential development is the most rapid form of land use change in much of the U.S. and many regions of the world. Urban development commonly displaces native biodiversity and triggers outbreaks of key plant pests that often require management. There is unprecedented public interest in wildlife conservation in urban and residential spaces due to increasing awareness of global biodiversity declines. This demand has triggered subsequent interest from green industry professionals, government entities, and other groups to offer plant production, landscape design, and management services that promote bees, butterflies,

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birds, and other wildlife in spaces where people live, work, and recreate. During this session, we will discuss recent research from the University of Florida focused on developing wildlife-friendly landscape management strategies spanning plant production, landscape design, and pest management. We will also discuss recent Extension programming translating this work into application and accessible resources so that green industry professionals and the public can simultaneously promote biodiversity while suppressing key insect pests that often inhibit conservation goals in urban ecosystems.

4:00 PM

35.3 Patricia Stock, Department Head and Professor, Department of Horticulture, Oregon State University, USA

Harnessing Secondary Metabolites of Entomopathogenic Nematode's Symbionts as Novel Alternatives for IPM: Entomopathogenic Photorhabdus and Xenorhabdus bacteria have a dual lifestyle: they are pathogens of insects and are mutualists of entomopathogenic nematodes Heterorhabditis and Steinernema, respectively. This nematode-bacteria partnership has been used to successfully control a wide range of agricultural insect pests. The bacterial symbionts produce a diverse array of small molecules that play key biological roles in regulating their dual roles. Among them, secondary metabolites (SM) are known to play a critical role in the maintenance of a monoxenic infection in the insect host and are also known to prevent contamination of the cadaver from soil microbes and/or predation by arthropods. A few of the SM this bacteria produce has been isolated and identified, and their biological activities have also been tested in laboratory assays. In this presentation I will summary the body of knowledge in relation to SM and their potential in pest management with focus on insects and plant-parasitic nematodes.

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Thursday, March 6th

36. IPM at the San Diego Zoo Wildlife Alliance

Breakout Topic: Practitioner

Location: Bayview

Session Abstract: San Diego Zoo Wildlife Alliance (SDZWA) is an international, nonprofit conservation organization with two front doors, the San Diego Zoo and the San Diego Zoo Safari Park. We integrate wildlife health and care, science, and education to develop sustainable conservation solutions. SDZWA is an accredited Botanical Garden along with a Zoo and we utilize IPM to keep our plant collections and native habitats healthy and thriving.

There are four different plant departments at SDZWA, Horticulture at the Zoo, Horticulture at the Safari Park, Plant Conservation and Natural Lands Management. Each department has unique challenges they address including South American Palm Weevil trapping, yellow jacket control, stinknet management and invasive shot hole borer.

This session will discuss the wide breadth of IPM practices in place throughout this organization. There will be 4 presenters highlighting the IPM in each department and time at the end for a Q&A.

Organizer: Christy Powell, Horticulture Manager, San Diego Zoo Wildlife Alliance

8:00 AM

36.1 Adam Graves, Director of Horticulture, San Diego Zoo Wildlife Alliance

Balancing Competing Agendas: Managing Pesticide Usage in a Multidisciplinary Conservation Organization: This presentation will focus on effective pesticide management in zoo and botanic garden environments, where the delicate balance between pest control and the well-being of wildlife and plants is crucial. It will address the risks associated with pesticide use, including potential harm to non-target species, including endangered animals and beneficial insects. Strategies for minimizing these risks through departmental collaboration will be discussed, including the use of less-toxic alternatives, targeted application techniques, and monitoring systems. Additionally, the importance of staff education and environmental sustainability in pest management practices will be highlighted to ensure a safe, healthy ecosystem.

8:20 AM

36.2 Christy Powell, Horticulture Manager, San Diego Zoo Wildlife Alliance

Invasive Pest Monitoring and Management at the San Diego Zoo: San Diego's mild year-round Mediterranean climate attracts millions of

visitors to its sunny beaches, low inland mountains and deserts, but this climate also attracts many invasive pest species. The San Diego Zoo has been battling invasive pests for decades and works closely with the County of San Diego, Agricultural, Weights and measures, local universities and the pest control community. We learn from each other and collaborate to best monitor and mitigate the damage from invasive pests. Some of the invasive pests include the following: giant white fly, invasive shot hole borer, South American palm weevil, Erythrina tip borer, Erythrina gall wasp, cycad aulacaspis scale. These invasive pests are here to stay, and new pests will be here in the future. Over time we learned to adapt and modify our management practices and plant selection to live alongside these new neighbors.

8:40 AM

36.3 Charlie de la Rosa, Scientist Natural Lands Management, San Diego Zoo Wildlife Alliance

Wildland Weeds and Adaptive Management of a San Diego Coastal Sage Scrub Preserve: Seasonal phenomena like precipitation amount, timing, average temperatures, and catastrophic events like wildfire strongly influence the structure and dynamics of native and invasive plant communities in coastal Southern California. The uncertainty presents a challenge to land managers attempting to set annual restoration targets. An adaptive management strategy builds flexibility into decision making by using the results of short-term experiments and new information to quickly adjust course. In the Safari Park Biodiversity Reserve, a 900-acre coastal sage scrub preserve in San Diego's North County, we are managing wildlands to remove stinknet (*Oncosiphon pilulifer*), an invasive aster. To track our success and plan next year's treatments, we use both old-school vegetation surveys and cutting-edge remote sensing. Here, I will describe the challenges, discuss the methods we use to study vegetation change over time, and share results that help shape our management actions.

9:00 AM

36.4 Greg Porter, Horticulture Manager, San Diego Zoo Wildlife Alliance

IPM for Zoological Browse Fodder: In growing eucalyptus browse fodder to feed koalas, the San Diego Zoo's pest control strategy actively avoids chemical options due to unknown potential impacts on exotic wildlife. Therefore, their IPM program focuses on cultural and mechanical controls to combat lerp psyllid and tortoise beetle. Rogueing and syringing are common practices, and coupled with a diverse polyculture, there is an emphasis on cultivating healthy plants for a robust natural defense through water, soil, and fertility management. Management thresholds are higher than many commercial operations due to these limited strategies, but there are additional biosecurity mitigations along the supply chain. Chemical strategies have been

developed, but should the Zoo utilize these strategies, contaminated browse fodder is deemed unusable for six months.

37. Insights and Strategies for Effective Audio and Video Communication in Pest Management

Breakout Session: Communications & Outreach

Location: Docksid

Session Abstract: This session will explore best practices for using digital formats—such as instructional videos, podcasts, webinars, and online courses—in pest management communication. Presenters will share insights on what they wish subject matter experts knew before starting these projects. The session includes a panel discussion on common challenges in collaboration between communication experts and subject matter experts, followed by a Q&A segment.

Our goal is to enhance participants' understanding of best practices in creating digital formats for pest management communication and address common challenges in collaboration between communication experts and subject matter experts.

During the session, we will use live polls or interactive tools to engage the audience and collect questions for the panel discussion. Afterward, we will distribute a feedback survey link to participants.

Organizer: Petr Kosina, IPM Content Development Supervisor, University of California Agriculture and Natural Resources, USA; Cheryl Reynolds, UC IPM Interactive Learning Developer, University of California Agriculture and Natural Resources, USA

8:00 AM

37.1 Petr Kosina, IPM Content Development Supervisor, University of California Agriculture and Natural Resources, USA

Introduction

8:05 AM

37.2 Phoebe Gorden, UCCE Orchard Systems Advisor, University of California Division of Agriculture and Natural Resources, USA

Podcasts: Phoebe Gordon, co-host of the *Growing the Valley* podcast series, will explore podcasts as a less common but effective extension tool. Since its 2018 launch, the series has delivered expert interviews and broader discussions, in episodes ranging from 10 to 60 minutes. Phoebe will share the format's benefits and challenges, along with practical tips for those considering this medium.

8:20 AM

37.3 Petr Kosina, IPM Content Development Supervisor, University of California Agriculture and Natural Resources, USA

Instructional Videos: Since 2012, UC IPM has developed over 50 instructional videos. Petr Kosina will share best practices for producing short, impactful videos and provide insights into UC IPM's streamlined design and development process, emphasizing how to create engaging and effective content.

8:35 AM

37.4 Karey Windbiel-Rojas, IPM Associate Director for Urban & Community IPM/ Area Urban IPM Advisor, University of California Agriculture and Natural Resources, USA

Webinars: Webinars gained momentum during the COVID-19 pandemic. Karey Windbiel-Rojas will share experiences from UC IPM's monthly *Urban & Community Webinar Series*, which covers pest management topics in diverse settings such as gardens, homes, and structures. She will highlight best practices and key takeaways from both hosting and presenting webinars.

8:50 AM

37.9 Cheryl Reynolds, UC IPM Interactive Learning Developer, University of California Agriculture and Natural Resources, USA

Online Courses: UC IPM has developed nearly 20 online courses tailored to California pest management professionals, many offering Continuing Education Units (CEUs). Cheryl Reynolds will outline two main course development pathways and share crucial considerations for designing engaging and professional online courses.

9:05 AM

Panel Discussion and Q&A (25 mins)

38. Closing Plenary/Lifetime Achievement Awards

9:45 AM

38. 1 Address by International IPM Lifetime Achievement Awardee Peter Mason, Agriculture and Agrifood, Canada (recorded video)

10:00 AM

38.2 Address by International IPM Lifetime Achievement Awardee Ulrich Kuhlmann, CABI, Germany

10:25 AM

38.3 Closing Remarks; Matt Baur; Director, Western IPM Center

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Poster Session: Wednesday, March 5th, 4:30- 6:30 PM

P1 • IPM adoption and challenges: a three-year survey of private pesticide applicators in Virginia; Daniel Frank

Recognizing the need to understand the drivers and barriers to IPM adoption among agricultural producers, a series of IPM-related questions was included in Virginia's annual survey of private pesticide applicators beginning in 2022. These questions aimed to assess the extent to which agricultural producers were using IPM and its impact on their overall pesticide use. Additionally, the survey sought to identify factors that may inhibit IPM implementation and to pinpoint specific pests posing significant economic threats to crop production. The survey results showed a positive trend, with the majority of respondents reporting that they practice IPM and actively monitor for pests. However, despite these encouraging findings, no evidence suggested that IPM adoption had significantly reduced overall pesticide use. The identification of arthropod pests responsible for severe economic crop damage provides further insight into the challenges faced by Virginia's agricultural producers and may help guide future research efforts toward developing more targeted and effective control strategies.

P2 • Incorporating ecological engineers in rice fields to develop next-generation pest control services; Md Panna Ali

Pesticides are commonly used in food crop production systems to control crop pests and diseases and ensure maximum high-market-value yield. However, the accumulation of these chemical inputs in crop fields increases risks to biodiversity and human health. In addition, people are increasingly seeking foods in which pesticide residues are low or absent and that have been produced in a sustainable fashion. For instance, chemical pesticides to control pests is the dominant paradigm in rice production. However, the use of natural enemies to suppress crop pests has the potential to reduce chemical pesticide inputs in rice production systems. Currently, predators and parasitoids often do not persist in rice production landscapes due to the absence of shelter or nutritional sources. In this study we altered the rice landscape through an eco-engineering technique that aimed to increase natural biocontrol agents for crop protection. In this system, planting nectar-rich flowering plants on rice bunds provided food and shelter to enhance biocontrol agent activity and reduce pest numbers, while maintaining grain yield. The abundance of predators and parasitoids and parasitism rates increased significantly in the eco-engineering plots compared to the insecticide-treated and control plots. Moreover, a significantly lower number of principal insect pests and

damage symptoms were found in treatments where flowering plants were grown on bunds than in plots where such plants were not grown. This study indicates that manipulating habitat for natural enemies in rice landscapes enhances pest suppression and maintains equal yields while reducing the need for insecticide use in crop fields.

P3 • Agroecological approaches promote the sustainable management of *Spodoptera frugiperda* in maize: experiences from Bangladesh; Md Mostafizur Rahman Shah

Maize is an important cereal crop in Bangladesh due to its high demand in the feed industry, for human consumption, and in starch production. One of the major challenges to maize production is the infestation of insect pests. Recent invasion of the devastating and highly polyphagous Fall Armyworm (FAW), *Spodoptera frugiperda* further confronts the maize production in Bangladesh. An agro-ecological approach to combat the FAW was investigated in the last two successive seasons of 2020-21 and 2021-22, at three locations in the first year and two in the second year, namely Dinajpur, Rajshahi, and Gazipur in Bangladesh. Investigations were carried out using cowpea as an intercrop with different spacing. Monitoring through using pheromone traps showed that FAW population pressure increases from February, peaks in March and decreases gradually from April. Foliage damage was significantly higher in the monoculture maize field than in the intercropped field. Cob damage did not vary among the mono- and intercropped maize fields but varied significantly among the locations. Yield-contributing characters also varied significantly. A significantly higher yield was obtained from 60cm spacing than 90cm and higher economic return was attained from intercropped approaches. When compared, a higher number of predator and pollinator insects were observed in the intercropped field than the monocropped maize field. Therefore, our findings demonstrated that agro-ecological interventions, such as intercropping with cowpea, not only successfully reduced the number of FAW to tolerable levels but also created favorable environmental conditions for beneficial insects, and ultimately increased the net-income of small farmers in Bangladesh.

P4 • Efficacy and profitability of IPM in boosting production on cacao plantations in Isabela Province, Philippines; Myleen Corpuz

Many pests, like cocoa mosquitos, infest cocoa, resulting in low yields in cacao-producing nations like the Philippines. In Isabela Province, Philippines, synthetic pesticides are recommended to combat insect pests, as well as a combination of synthetic pesticides and cultural practices for diseases and weeds. Farmers in Isabela Province, on the other hand, do not want

to follow these guidelines because pesticides are expensive, and producer prices are low. There is also concern that widespread usage of synthetic pesticides may harm both human health and the environment. With the goal of increasing cacao yields through environmentally friendly pest control practices, an integrated pest management (IPM) package based on biological control for insect pests and cultural practices for disease and weed management was evaluated in farmers' fields with their active participation. The IPM package increased yields significantly and was proven to be more profitable than farmers' current approaches.

P5 • Survey and testing the effects of feed through insecticides on dung beetles on NYS cattle pastures; Kenneth Wise

Dung beetles play a crucial role in pasture ecosystems by recycling manure, enhancing soil health, and competing with horn and face flies for resources. During the 2024 growing season, we surveyed 19 cattle farms across New York State to assess dung beetle diversity and abundance. Eight of the farms used feed-through insecticides for horn and face fly control, while the remaining farms did not. On each farm, we collected 20 manure samples biweekly from May 1 to September 30, for a total of 3,800 samples. These samples were processed using modified Berlese funnels to extract beetles. We captured over 10,000 Scarabaeidae beetles, identifying 15 species within the Aphidiini tribe and four species from the Onthophagini tribe. Additionally, approximately 10,000 Hydrophilidae beetles were collected.

We are currently analyzing the data statistically, and the results will be presented in a poster session. The findings are expected to shed light on how feed-through insecticides influence dung beetle populations and their ecological functions on New York State cattle farms.

P6 • Evaluating effective alternatives to neonicotinoid seed treatments for seedcorn maggot control in corn; Kenneth Wise

In spring, adult seed corn maggot (*Delia platura*) flies lay eggs in fields planted with corn and soybeans. Fields at higher risk include those with cover crops and manure applications, which are prevalent in New York State. Seed corn maggots are attracted to these fields and lay eggs in the soil. After eggs hatch, maggots locate germinating seeds, burrowing into them and consuming the interior tissue. This feeding behavior can significantly reduce plant populations in fields with elevated organic matter.
Neonicotinoid seed treatments have historically been used to protect crops; however, these compounds are now recognized for their adverse effects on pollinators and their potential to contaminate surface and groundwater. From 2022 to 2024, we conducted 10–16

trials annually across multiple state locations to evaluate alternative seed treatments. These included diamide, spinosad, neonicotinoid, fungicide, and untreated seeds. Laboratory bioassays and field trials demonstrated that diamide is an effective alternative to neonicotinoids, while spinosad also shows some promise. Field infestation rates were generally low, indicating that severe seed corn maggot damage may be uncommon.

P7 • Predatory mite communities in Ontario and Quebec hopyards for integrated management of spider mites; Cezarina Kora

Hops are grown commercially on 140 ha in the Canadian provinces of Ontario and Quebec. Spider mites (Tetranychidae) are serious pests of hops, lowering harvest quality of cones through feeding damage. Naturally occurring predatory mites may control spider mites, but the species occurring in Canadian hopyards are not well-known. Leaf (basal and 2m height) and cone samples were collected on 3 dates in 2022 and 2023 from 20 locations in 9 hopyards in Ontario and Quebec and mites were recovered for identification. There were 97% and 94% *Tetranychus urticae* (two-spotted spider mite) in 2022 and 2023, respectively. *Tetranychus schoenei* was the only other spider mite species recovered. Nine species of predatory mites (Phytoseiidae) were found over both years, of which *Neoseiulus fallacis*, *Galendromus occidentalis*, and *Amblyseius andersoni* accounted for about 96% of the total each year. Spider mite populations started on basal leaves in June, moving to 2m high leaves in July and August. There were 10-fold fewer spider mites on cones than leaves in August, and a higher predatory to spider mite ratio on cones than leaves. Hopyard interior sampling locations had more spider mites early in the season, but edge and interior locations had equal numbers later, as immigrating spider mites moved into hopyards. Predatory mite distributions followed spider mite distributions, and there were significant correlations between population numbers by August in 2023. Our results inform development of biocontrol strategies to achieve integrated management of spider mites in hops through augmentative releases of commercially available predators or by conserving naturally occurring communities.

P8 • Genetic tests accelerate detection and mitigate the risk of herbicide-resistant weeds in Canada; Cezarina Kora

Crop production in Canada is greatly affected by herbicide-resistant weeds. Herbicide resistance is estimated to cost Canadian farmers in some provinces between $43 and $343 Million annually due to increased use of herbicides and decreased crop yield and quality from weed competition. Traditional dose-response methods using weed seeds planted and grown in a greenhouse to confirm resistance to specific herbicides in suspected weeds can take 6-12 months

and results can only be considered for decision making purposes in the following season. Recently developed genetic tests use leaf tissues from suspected weed samples collected in fields and involve DNA extraction and analyses to determine the presence of mutations conferring resistance in the plant. This molecular approach renders resistance testing much cheaper and faster, hence more accessible to farmers. Test results can be communicated back to farmers within 1-2 weeks of sampling, allowing efficient, in-season decision-making and adjustments to weed management programs. Since 2015, multi-partner projects featuring collaborative networks of federal, provincial, and private researchers continue contributing to a growing list of quick genetic test protocols for many concerning weed species. There are currently at least 94 developed and validated tests made available to regional service labs offering testing to farmers for 30 weed species covering 5 herbicide resistance groups. Thousands of genetic tests have been conducted commercially across many Canadian provinces. These services support information-based weed management decisions at field level through enabling farmers to detect issues early and make timely choices based on the presence of resistant weeds in their crops.

P9 • Benefits of insect netting to control cabbage maggot in brassica crops; Cezarina Kora

Cabbage maggot remains an important pest for brassica vegetable crops. With the phase-out of chlorpyrifos products in Canada since January 2024, there is an increasing need for alternative solutions to manage this pest in both root and leafy brassica vegetables. Previous research showed that insect netting can be effective to manage cabbage maggot. On-farm demonstration projects were established to achieve knowledge transfer and show growers the benefits and economics of adopting the insect netting technology commercially. Wondermesh insect netting of 0.8 mm mesh size was deployed over transplanted cabbage, rutabaga, and turnip crops using the mechanical HIWER rollers and reels system. The netting was secured with sandbags and metal rods. Demonstration trials confirmed that netting cover offers a viable alternative option for cabbage maggot control and showed growers how to efficiently deploy netting with a mechanized system. Adoption of netting reduced by 75-100% the need for insecticide sprays against all Brassica pests while maintaining yields comparable to control plots subjected to standard pesticide spray regimes. A partial cost-benefit analysis over a 15-year period estimates that using netting with the HIWER system increases operation cost of crop protection by $20,000. However, given the environmental benefits, cooperative equipment sharing and subsidy programs are expected to promote a more widespread uptake of this technology. Adoption of this alternative practice as part of an integrated management system could significantly reduce or completely eliminate the need

for treatments with conventional insecticides, addressing concerns about pesticide resistance and chemical load in the environment.

P10 • The pesticide risk reduction program: A Canadian initiative to help growers achieve pesticide risk reduction goals; Cezarina Kora

National in scope and in operation since 2003, the Pesticide Risk Reduction Program of Agriculture and Agrifood Canada's Pest Management Centre is mandated to reduce the risks associated with the use of pesticides in agricultural crop production. The Program achieves this goal by improving grower access to alternative pest management solutions, including decision support tools, biocontrol products, beneficial practices and integrated management systems to address priority pest issues. Since inception, the program has supported over 230 research, development, and technology transfer projects leading to new pest management solutions to benefit the agriculture sector and the environment. The Program has published 36 crop profiles and facilitated registration of 29 new biopesticide products as key IPM and resistance management tools. The results coming out of the Program activities are widely disseminated, and new technologies are promoted through a variety of communication channels and media promoting grower awareness and uptake. The Pesticide Risk Reduction Program works closely with the Minor Use Pesticides Program, also under the Pest Management Centre, to help Canadian growers achieve sustainable pest management goals. The Minor Use Program supports registration of chemical pest control options for minor crops, such as horticulture and specialty crops. It achieves this mission through conducting field efficacy and residue trials to generate data necessary to fulfill regulatory requirements for registration of new pesticide uses for these crops. There are about 40 science professionals and technicians working to deliver both Pesticide Risk Reduction and Minor Use Pesticides Programs located at 12 federal research centers across Canada.

P11 • (a & b) Canada's national program for biological control of invasive arthropods and plants; Cezarina Kora

Biological control agents (BCA), including beneficial parasitoid and predatory organisms, provide natural pest control to protect crops and the environment by reducing, or eliminating the need for chemical pesticides. Using live organisms to manage insects and weeds has been explored since the early 1880s. Agriculture and Agri-Food Canada (AAFC) scientists have established significant expertise discovering, developing and validating biocontrol solutions leading to the introduction of many BCAs to protect crops and natural ecosystems in Canada. Biocontrol agents can come from multiple taxa and include beneficial insects, mites,

nematodes and fungi. Biocontrol agents are targeted against invasive species which invade new areas without encountering natural enemies from their place of origin. Invasive species can significantly affect ecosystem health through displacement of native species, thus disrupting biodiversity. Canada has an extensive track record in the biocontrol of introduced pests through releases of >200 BCAs against 92 invasive species since 1950. As part of the National Biocontrol Program for Invasive Arthropods and Plants, AAFC scientists aim to identify, develop and release biocontrol agents which are host specific and can be safely released to attack only the intended target pest. Major successes include establishing effective management systems for invasive plants such as leafy spurge, houndstongue, diffuse knapweed, purple loosestrife, and dalmatian toadflax, and invasive insect pests, such as wheat midge, lily leaf beetle, cereal leaf beetle, leek moth.

P12 • Toxicity of pesticides to citrus mealybug natural enemies; Sandipa Gautam

Citrus mealybug (*Planococcus citri*) is a polyphagous pest that affects citrus and various other plants. Mealybugs are small, soft bodied, oval-shaped insects covered in a white, waxy powder and are often found in clusters. They cause damage by sucking plant sap, causing yellowing of leaves and fruits and indirect damage by depositing honeydew that results in sooty mold growth. Although present in citrus systems in California, mealybugs were kept in check by natural enemies and did not require targeted management until 2020. In recent years, mealybugs have become an increasingly challenging problem. Field trials identified several pesticides registered for citrus in California are toxic to citrus mealybug and can be used for near-term management. However, toxicity of insecticides on mealybug predators/parasitoids is an important factor to consider in integrated pest management (IPM) strategies. We conducted laboratory bioassays to evaluate acute toxicity of five pesticides: abamectin, acetamipirid, azadirachtin, afidopyropen, and spirotetramat. Two life stages of a mealybug predator, larvae and adults of mealybug destroyer (*Cryptolaemus montrouzieri*) and adult stage of a mealybug parasitoid, *Anagyrus vladimiri*, were tested. Fully opened leaves were dipped in pesticide solutions, air dried, and natural enemies were released. Mortality was assessed at timed intervals, 2, 4, 8, 12, 24, and 48 hours after exposure to treated leaves. Results are discussed in the context of IPM of citrus mealybug. Research was supported by the Citrus Research Board.

P13 • Nevadascapes: a sustainable landscape design approach to teaching water quality protection practices; Carrie Jensen

Water scarcity and decreased water quality are problems for urban areas in the state of Nevada, USA, where most of the

population lives in closed watersheds. Water quality studies found detectable levels of pesticide residues in waterways located in urban sites in Nevada (Thodal et al., 2009; Huntington et al., 2020). These pesticides included herbicides frequently used for nonagricultural purposes in urban areas. As Nevada's urban populations have increased (U.S. Census Bureau, 2020) and climate-change related droughts are of greater concern (Elgeberi et al., 2022), the need for education regarding landscape water conservation and watershed protection is growing. In 2022, we partnered with the local nonprofit One Truckee River to develop a hands-on training called Nevadascapes, which helps homeowners conserve landscape water and reduce irrigation runoff, keeping pesticides and other pollutants out of local waterways. Classes focus on landscape and irrigation system design and plant selection, including native and pollinator-supporting plants. As of October 2024, 122 community members have attended these classes, which sell out quickly each time we offer the program. Attendees complete a pre-and post-training survey to assess their knowledge of key principles before and after the training. These surveys reported an average increase in knowledge of 57.4%, with 97.3% of participants intending to use at least one recommended practice. Our strategy for increasing statewide access to Nevadascapes is to create an online, on-demand program that provides basic watershed protection information, with at-home exercises participants can use to strengthen their skills.

P14 • Basics of landscaping in Florida, Conceptos básicos de paisajismo en Florida; Hannah Eason

Florida's environmental horticulture industry exceeds $10 billion in annual value, employing more than 100,000 people, with 33% identifying as Hispanic/Latino. Landscaping is a major contributor to these jobs, focusing routine plant maintenance on aesthetics. Traditionally, pest management within the industry has relied on reactive, chemical-based solutions rather than cultural integrated pest management (IPM) practices. Many landscaping positions lack formal certification; therefore, training is often in-house. Florida's landscape workforce includes both English and Spanish speakers on multilingual teams. Language barriers limit the adoption of sustainable practices as most training resources are only available in English. In 2021, a multi-county team of Florida Extension Agents received a USDA-NIFA IPM Extension grant to create basic bilingual landscaping materials focusing on best practices and IPM. A waterproof, pocket-sized booklet entitled *Basics of Landscaping in Florida, Conceptos Básicos de Paisajismo en Florida* with information in both English and Spanish was published in April 2024. The booklet is being distributed to a wide audience, paired with classes, and being sold in the UF/IFAS Bookstore. Two free webinars were presented, one in English and one in Spanish, to 132 participants and receiving

107 follow up Qualtrics survey responses. Booklets were mailed to participants. Survey results indicate 85% of participants increased knowledge about basic best practices with 69% - 96% intending to implement various practices. Furthermore, landscape industry trainers have adopted the booklet and plan to purchase more to provide to their employees during internal training. This presentation will cover the team's approach, insights, and results to date.

P15 • Perennial cover crops as an IPM practice to manage thrips and enhance arthropod diversity in cotton; Francis Reay-Jones

Perennial groundcover cover crops are being investigated as an alternative to the use of herbicide in cotton. Because ground cover resulting from annual planting of cover crops has previously been shown to decrease thrips densities in cotton, the goal of this research was to examine how a perennial cover crop may reduce the incidence of thrips and increase arthropod diversity in cotton agroecosystems. Treatments included combinations of white and red clover, annual ryegrass, and tall fescue, in addition to fallow control plots. Averaged across two years and compared to a mixture of clovers and annual ryegrass, fallow plots had 1.8-, 4.6-, and 3.4-fold greater immature thrips densities in cotton at the cotyledon, 1st, and 3rd true leaf stage, respectively. Cover crops also reduced injury from thrips feeding compared to fallow plots. Higher densities of arthropod predators and herbivores were sampled in sweep nets in plots with a clover cover crop compared to fallow and ryegrass cover crop plots. Perennial cover crops with clover have potential in reducing thrips incidence in cotton while also promoting arthropod diversity.

P16 • An integrated approach to teaching and expanding what we mean by "IPM" – IPM program improves public health by reducing environmental and human health risk; Shujuan Li

The University of Arizona Public Health IPM Program raises public awareness and implements routine monitoring to protect human health and the environment. The goal of the program is to improve public health by reducing environmental and human health risks. We develop and implement priority engaged research and Extension public health programs statewide. Currently we work in four priority areas: 1) IPM in tribal communities; 2) Vector control; 3) IPM in schools and housing; and 4) Food safety.

We partnered with diverse collaborators to identify and address priority training needs for public and environmental health, and provided need-based, community-driven education focused on reducing environmental risks and public health threats using IPM practices. Multi-media outreach helped to maximize the impact of our education efforts. Across all

training events, health and well-being of audiences were improved by increasing awareness and knowledge of vector pests, public health pests, pesticide safety, food safety, and IPM practices in their environments.

University experts, public health agencies, farmers, growers, ranchers, producers, and tribal collaborative groups involved in this program shared common goals to reduce environmental and human health risks, and to enhance emergency preparedness within the communities. As a result of this program, the team of scientific experts are better connected with tribal communities, and community leaders are more informed about their needs and priorities. Arizona citizens and public health professionals have improved access to the latest scientific findings and best management practices to improve public and environmental health and to address priority needs of diverse audiences.

P17 • Poster submission withdrawn.

P18 • Residual activity of chemical and non-chemical controls for rice weevil in stored corn grain; Glenn Studebaker

The rice weevil, *Sitophilus oryzae*, is a major pest of stored grains. If not managed effectively, this insect pest has the potential to cause total loss in stored grain commodities. Preventative insecticide treatments are one option available to growers to protect corn in storage. These treatments are recommended for application to grain as it is loaded into storage bins to prevent stored grain insect pests. However, reliance solely on insecticides can lead to development of resistance. Grain protection insecticides as well as silicon dioxide, a non-chemical option, were evaluated for their length of residual activity against rice weevil in stored corn grain. Silicon dioxide gave similar residual control to deltamethrin and s-methoprene but was not as effective as malathion or pirimiphos-methyl.

P19 • KASP assays to identify resistance to fungicides in the plant pathogen *Stemphylium vesicarium;* Mary Ruth McDonald

Stemphylium leaf blight (SLB) caused by *Stemphylium vesicarium* is the most common foliar disease of onion in Ontario, Canada. Management of SLB relies on repeated fungicide applications and most fungicides are in the succinate dehydrogenase inhibitor (SDHI) mode of action group. The strobilurin fungicide, azoxystrobin was applied regularly until very high resistance was confirmed in 2021. Both groups of fungicides have poor efficacy in the field. Isolates of *S. vesicarium* from New York State, classified as highly resistant to SDHI fungicides, frequently had one of three mutations, C-G79R, C-H134R and C-C135R, in the gene encoding succinate dehydrogenase subunit C (sdhC). Also, resistance to the strobilurin fungicides in New York State was associated with the G143A gene in cytochrome b. In the current study, Kompetitive Allele Specific PCR (KASP) assays were designed to

detect the single nucleotide polymorphisms (SNPs) of C-G79R, C-H134R and C-C135R in sdhC and the G143A gene. The assays were tested on 70 isolates of *S. vesicarium* collected in Ontario from 2012-2023 that were previously classified as either sensitive or resistant to these fungicides. Resistant isolates were sequenced to detect additional mutations. Mutation C-H134R was identified in 29%, C-G79R in 7% and C-C135R in 3% of isolates. An additional mutation, C-H134N, was detected by sequencing in 23% of isolates. The G143A mutation was found in all 67 isolates collected after 2016. The KASP assays were fast and efficient. They are effective for monitoring fungicide resistance in *S. vesicarium* and could be developed for other fungi.

P20 • Forecasting and managing onion downy mildew using DOWNCAST; Mary Ruth McDonald

Onion downy mildew, caused by the oomycete *Peronospora destructor*, is a highly destructive foliar disease of onion. The disease does not occur every year in the Holland Marsh, Ontario, Canada, so disease forecasting can be very useful. Symptoms develop 10 – 14 days after infection and downy mildew specific fungicides must be applied prior to infection to be effective. The disease forecasting program DOWNCAST is used to time fungicide applications when there is disease risk. The IPM program operating in the Holland Marsh provides disease risk updates to local growers throughout the growing season. The risk of sporulation and infection, known as sporulation infection periods (SIPs), is based on daily air temperature, relative humidity, leaf wetness duration and temperature, plus temperature in the days following potential infection. Fungicide sprays are recommended when there are SIP's or if disease symptoms are found on onions in the region. The presence of sporangia of *P. destructor* on rotorod traps is also an indication of high risk. From 2012 to 2024, the forecasting system was accurate in 11 of 13 years. Weather conditions were favorable for downy mildew in 2023 and 2024, and fungicide efficacy trials were conducted. The trials confirmed that Ridomil and Orondis Gold (mefenoxam S and oxathiapiprolin plus mandipropamid) were effective when applied at the first indication of disease risk. The DOWNCAST model alone was mostly effective and was improved with the trapping and same-day identification of sporangia. DOWNCAST continues to be a useful disease management tool for growers.

P21 • Phytopoetry and the undergrowth: IPM outreach with verse and video; Adam Sisson

Fictional character Dr. Sebastian E. Bartholomew is a bumbling and pompous scientist who creates plant pest poetry and interviews experts as a non-traditional method to communicate integrated pest management (IPM) and bring attention to Extension resources. Multimedia outputs

include full-length books such as *At Field's End* and *It's Still Edible*, X and Instagram accounts, and multi-format videos. Played by Iowa State University Extension Specialist Adam Sisson, Dr. Bartholomew believes himself to be quite talented, while everybody else knows otherwise. In "The Undergrowth," Dr. Bartholomew interviews IPM specialists with humorous questions regarding their expertise such as "How many ticks does it take to kill a man?" and "Who milks the bees?" but also asks questions to help viewers understand the importance of the IPM specialist's work. "The Undergrowth" consists of 24 videos with 11,200+ views, 225+ hours watch time, and 84,700+ impressions. Phytopoetry video outreach consists of Dr. Bartholomew reading poetry like "Cute Fluffy Soybean Slayer" and "Guts Like Guacamole." Twenty-nine Phytopoetry videos have 5,900+ views, 81+ hours watch time, and 119,600+ impressions. Phytopoetry books include plant-related images and poetry such as "Real Crop Scouts Ride Dinosaurs" and "Flock of Mohawks." On X, short poetry is used to draw attention to timely or important topics such as invasive pests and plant disease. Instagram posts use humor and video to present poetry about pests. X and Instagram accounts have a combined 1,285 followers. Access to The Undergrowth and Phytopoetry outputs can be found at https://linktr.ee/phytopoetry.

P22 • Tactile toolbox: 3D printing resources for research and extension; Adam Sisson

Accurate disease severity assessment is critical for fungicide evaluation or insect leaf defoliation, but visual estimation can lead to inconsistent results. Existing tools like standard area diagrams and interactive software may have training limitations that can be addressed with tactile 3D-printed tools. A tactile experience may increase understanding through interaction with physical 3D models. 3D models offer customization, flexibility, and an immersive learning experience. The Tactile Toolbox Working Group was developed through the North Central Integrated Pest Management (NC IPM) Center to better understand 3D printing needs and devise solutions. One goal was to enable non-experts to print 3D models for research and extension using low-cost printers and free models. As part of this project, a library of 3D models was developed and is online at https://resources.ipmcenters.org/view/?type=29. Models include corn and soybean leaves with differing amounts of insect defoliation and various diseases. People with 3D printers can download and print models for their own research or Extension uses. Eventually, the Tactile Toolbox library aims to be a repository for various 3D resources. As part of this project, a workshop was held at the 2024 NC American Phytopathological Society meeting to introduce approximately 40 participants to 3D printing basics. This

included an introduction to the software required to develop 3D models, turning images into 3D models, and using the Tactile Toolbox library. This working group plans to continue development of 3D resources for crop scouts, researchers, and Extension workers on multiple plant pest issues.

P23 • Optimizing integrated controls for sugarcane stem borers in Louisiana, USA;

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Two stem borers in the family Crambidae, the sugarcane borer, *Diatraea saccharalis*, and the Mexican rice borer, *Eoreuma loftini*, are the most economically damaging insect pests of sugarcane (*Saccharum* spp. hybrids) in Louisiana. Advances in integrated pest management strategies reduced reliance on insecticides for stem borer control in the Louisiana sugarcane industry from the 1970s until the early 2000s. More recently, optimization of chemical control, renewed reliance on resistant cultivars, and improved production practices have further reduced economic impacts of the two pests to US$8 million annually, less than 1% of the total crop value. Systemic activity of chlorantraniliprole provides up to ten weeks of protection, reducing the need for multiple insecticide applications in a single growing season. The negligible impact of this chemistry on key natural enemies allows for conservation biological control from two invasive predatory ants, *Solenopsis invicta* and *Nylanderia fulva*. Varietal resistance through a complex of mechanisms including rind harness and leaf sheath oppression has led to development of resistant cultivars with 80% reductions in borer injury relative to susceptible cultivars. Collectively, these efforts have greatly reduced spring *D. saccharalis* populations and the number of hectares requiring insecticidal protection. Despite the reduction in insecticide use, levels of borer injury at harvest are less than 1% bored internodes. Continued geographical expansion of the invasive *E. loftini* may lead to increases in insecticide use in the future, but recent observations suggest this borer can be managed using similar strategies to *D. saccharalis*.

P24 • New York state integrated pest management response to the invasive box tree moth (*Cydalima perspectalis*);

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The invasive box tree moth (*Cydalima perspectalis*) poses a significant threat to boxwoods (*Buxus* spp.) in North America, impacting both landscapes and nurseries. Since its initial arrival in the United States from Canada into New York State, the box tree moth has spread, causing extensive defoliation and mortality in boxwoods, which are valued for their economic and aesthetic contributions to the horticulture industry. In response, the New York State Integrated Pest Management (NYSIPM) program has implemented a comprehensive approach utilizing outreach and collaborative partnerships to equip nursery operators,

landscapers, and home gardeners to recognize and manage this new pest.

To support our work, a new website was created to share key information on box tree moth identification, monitoring, and management strategies. We also researched and created a NYS appropriate list of alternatives to boxwoods and established a demonstration planting with these boxwood substitutes. Additionally, a targeted social media campaign was launched to reach specific audiences within New York State.

Through online resources, presentations, workshops, and direct consultations, NYSIPM aims to mitigate the impact of box tree moth in the landscape and nursery industry while minimizing environmental consequences throughout New York State.

P25 • Economic impact of the invasive spotted lanternfly (*Lycorma delicauta*, Hemiptera: Fulgoridae) in the two largest grape production areas of New York;

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The Spotted Lanternfly (SLF), native to Asia, feeds on over 100 U.S. plant species. Since its detection in Pennsylvania in 2014, SLF has rapidly increased in density, economic impact, and geographical spread. Pennsylvania growers faced substantial losses early on, with some vineyards needing replanting due to vine death. As of early 2024, New York State (NYS) grape growers had not reported SLF-related issues. However, in July 2024, state agriculture officials confirmed the presence of SLF in the Finger Lakes region, alarming local grape growers as this was the first instance of SLF near commercial vineyards in the area. Despite its rapid spread, significant advancements have been made in cultural, biological, and chemical control strategies to manage and mitigate the risks and losses associated with SLF. This study aims to estimate the potential economic impact of SLF in New York State's (NYS) two largest grape-growing regions. We hypothesize that NYS growers, learning from Pennsylvania's experience, will adopt a risk-averse approach and be better prepared to combat SLF. Comprehensive information on SLF is crucial for informing growers, stakeholders, and policymakers about the potential economic losses in NYS grape production. If left uncontrolled, economic losses in the two largest grape production regions could reach $1.5 million, $4 million, and $8.8 million in the first, second, and third years of infestation. This highlights the urgent need for effective management to mitigate SLF's impact on agriculture. Future research should establish economic thresholds and conduct cost-benefit analyses of pest control measures in NYS grape production.

P26 • U.S. pesticide policy is influenced by stakeholder comments managed by the Western IPM Center; Alfred Fournier

Under the Federal Insecticide, Fungicide and Rodenticide Act, The Environmental Protection Agency (EPA) is required to review all registered pesticides to ensure that they pose no unreasonable adverse effects to human health and the environment. EPA's risk assessments and proposed decisions are published in the Federal Register and are open for public comment. As part of the pesticide review process, EPA considers data that may influence their models of risk or understanding of pesticide benefits. Comments may include scientific data from researchers and extension specialists, along with practical information from growers and pest management experts working in the field to explain pesticide use patterns, benefits, and alternatives. Five network coordinators working in tandem with the Western Integrated Pest Management Center develop information from growers and other stakeholders throughout the West to inform comments submitted to the EPA. Network coordinators represent 17 states and territories in five sub-regions (California, Desert Southwest, Intermountain West, Pacific Northwest and Pacific Islands). We analyzed EPA's responses to 95 comments submitted between 2012 and 2022. Results: 92% of submitted comments provided substantive data and were considered in the registration review process. For 22% of comments, EPA revised risk models or altered proposed decisions in ways that benefited growers while protecting public health and the environment.

P27 • Insect aggregation pheromones: An invitation for vegetable IPM development; Don Weber

Chrysomelid leaf beetles and pentatomid stink bugs often use male-produced aggregation pheromones (attractive to males and females) to colonize hosts, including crops. Some important pests' aggregation pheromones are already known and synthesized. Availability of synthetic pheromones offers opportunities to develop behavioral control as an important tactic in vegetable IPM, while reducing pesticide applications and negative non-target effects in pest management. Additionally, plant-produced attractants, often less expensive, in some cases add to or even synergize pheromone-based attraction. Important species include Colorado potato beetle, cucumber beetles, crucifer flea beetles, harlequin bug, and other species. Tactics that are promising include trap cropping, mass-trapping, attract-and-kill baiting, and push-pull systems. Let's talk about developing new tools for vegetable IPM!

P28 • A Borich model IPM needs assessment: Survey development best practices for extension IPM programs; Tegan Walker

Needs assessments are broadly used for assessing training needs and developing program objectives. Better understanding the IPM training needs of Extension agents leads to improved programmatic decision making and ultimately improved IPM adoption as Extension agents are critical to the dissemination of IPM practices. A Borich Model needs assessment not only asks participants to rank competencies based on their level of knowledge, but also how important each competency is for performing their job well. A weighted mean discrepancy score is calculated for each competency based on participants' responses. Competencies can then be ranked to determine priority training needs to ensure the most relevant training is provided. The Borich Model needs assessment developed for this study assessed North Carolina Extension agents' IPM training needs. Thirty-five IPM competencies were developed, covering six IPM categories: (a) Extension Master Gardener Volunteers, (b) Prevention, Avoidance, Monitoring, and Suppression, (c) Pest Identification, (d) Pesticide Safety, (e) Pesticide Use, and (f) Pollinators. The IPM competency scales created for this survey yielded high levels of reliability when using Cronbach's alpha. This Borich Model IPM needs assessment instrument could easily be implemented in other Extension IPM programs across the United States and in other countries.

P29 • A pasture and animal plan to address longhorned ticks and *Theileria orientalis* impact on livestock; Timothy McDermott

There is an emerging animal health threat that may fundamentally change how we graze cattle in the United States for the foreseeable future. The invasive Longhorned tick has shown the ability to kill cattle as large as a full-grown bull from blood feeding, kill calves in as fast as five days on the animal, and transmit a protozoal disease, *Theileria orientalis*, which has no treatment, no vaccine, can exist in an asymptomatic carrier state, and has an estimated 5-10% fatality rate in cattle. The Longhorned tick was first discovered in high numbers on a farm in New Jersey in 2017. Since then, it has rapidly expanded to 21 states and Washington, DC, affecting most of the eastern half of the US. This tick spreads easily. It has been found on multiple migratory waterfowl including Canada geese. Once it finds a host and habitat, rapidly increasing due to global climate change, it can reproduce via parthenogenesis, where the female does not need to mate to lay her clutch of 2000 eggs. We will need to use all the tools in our IPM toolbox to address this threat to animal agriculture. This infographic will detail the state of Longhorned ticks in the US, the impact of *Theileria* in cattle, where to scout for ticks on the animal, forage and grazing management guidance, pesticide application impacts, and producer strategies to address this predator on both pasture and animals.

P30 • Evaluating area-wide integrated pest management programs for insect pests; Tom Coleman

For over 150 years, area-wide pest management programs, and subsequently named area-wide integrated pest management (AW-IPM) programs, have targeted numerous economic insect pests worldwide. AW-IPM programs systematically reduce the target pest(s) using various management strategies over large geographic areas, and have been implemented in diverse sectors, including forestry, veterinary, public health, row and field crops, and specialty crops, with the goal of eradication, prevention, or suppression. The U.S. Agency for International Development (USAID) collaborates with various countries and organizations to frequently implement AW-IPM programs to manage global emergency transboundary outbreak pests (GETOPs). The objective of this study was to assess the insect pests targeted, the IPM strategies utilized, and the general gaps in AW-IPM programs throughout the world. Peer-reviewed literature, pest databases, and pest program reports addressing AW-IPM programs were reviewed to capture specific program data (e.g., species targeted, host impacted, program objective, region, IPM strategies, area treated, etc.). This assessment can highlight regional pest management issues; compare the IPM tactics used to manage insect pests throughout the world; address environmental and non-target impacts associated with these treatments; and identify management and research gaps for developing pest programs.

P31 • This is IPM: A communication campaign highlighting the people and the process of integrated pest management Kayla Watson

IPM encompasses many settings, disciplines, and people, but this fact is not always apparent. This program aims to form a cohesive, harmonized, and collaborative IPM network through a communication campaign called, "This is IPM." This effort includes a dedicated website and social media channels with information about IPM, including its process, the people who practice it, and resources for those that want to know more about the discipline.

P32 • The changing insect pest complex of soybean in North Dakota; Janet Knodel

North Dakota soybean production has increased over 60 times from 1980 to 2023 and today North Dakota ranks #4 in U.S. soybean acres. Insect pest management is a critical part of an Integrated Pest Management (IPM) program for successful soybean production. As part of the IPM Crop Survey program of North Dakota, scouts and Extension Specialists have scouted soybeans annually for two key insect pests: soybean aphid (*Aphis*

glycines) and bean leaf beetle (*Cerotoma trifurcata*), and more recently for two new insect pests, soybean gall midge (*Resseliella maxima*) and soybean tentiform leafminer (*Macrosaccus morrisella*). Economic populations of soybean aphids are cyclical depending on the weather and other factors. However, populations of pyrethroid-resistant soybean aphids have increased, especially near the Red River Valley area. Sweep net samples and defoliation estimates of bean leaf beetles have shown increased prevalence, and this pest has spread further west and north in North Dakota. Soybean gall midge was first detected in Sargent County in one field in 2022, and no additional infestations have been observed since 2022. Soybean tentiform leafminer was first detected in 2023 in five counties and again in 2024 in four new counties of North Dakota. The changing insect pest complex demonstrates the importance of proper identification and routine monitoring of insect pests as part of an IPM crop program.

P33 • Canola flower midge, a potential new insect pest of canola in North Dakota and Minnesota; Janet Knodel

Canola flower midge, *Contarinia brassicola* (Diptera: Cecidomyiidae), was first discovered infesting canola (*Brassica napus* and *B. rapa*) in Saskatchewan and Alberta, Canada in 2014 and 2015. Larvae injure the canola flowers by causing a bottle-shaped gall, which prevents flowers from opening. Damaged flowers do not produce pods or seeds. Scentry LPD pheromone traps were monitored for adult flies in 81 canola fields in 21 counties of North Dakota during 2020-2024 and three fields in one county of Minnesota during 2023 and 2024. Canola flower midge was trapped in 44% of the fields in 10 counties in ND and one county in Minnesota. Over the past year, its distribution has been slowly expanding further south to more canola producing areas of North Dakota. A total of 2,842 canola flower midges were captured over the trapping period. No economic yield loss has been observed in pods or recorded by extension specialist or canola growers in the U.S. yet. Future trapping efforts and field observations will be essential for early detection of this new insect pest of canola in North Dakota and Minnesota.

P34 • Integrated pest management outreach and insights on the invasive spotted lanternfly in New York state; Jacob Leeser

This poster presents an overview of the New York State Integrated Pest Management (NYSIPM) program's efforts to mitigate the spread and impact of the invasive Spotted Lanternfly (SLF), *Lycorma delicatula*, which has been rapidly advancing across New York since its first sighting in 2020. Highlighting a multi-pronged approach, the NYSIPM program has partnered with Cornell University researchers, grape extension specialists, and various stakeholders to address SLF's

potential threat to the state's agriculture. Key strategies include early detection initiatives and extensive outreach campaigns to educate New York residents, grape growers, and vineyard workers. The program manages a dynamic online mapping tool, which has become the default U.S. distribution map for SLF. Additionally, extensive digital and media outreach has reached hundreds of thousands of residents, including Spanish-speaking field crews and historically underserved communities, like the Amish and Mennonite populations.

The poster also outlines collaborative SLF summits and workshops organized by NYSIPM, which engage over 800 educators and regulators nationwide. Resources for the public and professionals are readily available on the NYSIPM website, a central information hub. This comprehensive approach underscores the necessity of cross-sector partnerships, education, and readily accessible resources to manage the ongoing SLF invasion and safeguard New York's agricultural economy.

P35 • Expanding and evaluating monitoring methods for spotted wing drosophila (SWD); Anna Wallis

Spotted wing drosophila (SWD) is an invasive pest that has devastated berry and stone fruit crops across North America. Monitoring is critical for initiating spray programs to ensure adequate crop protection, while mitigating effects of pesticides. A statewide monitoring network has been in place in New York since the introduction of SWD. In 2023-24 we developed a new map, blog, and data entry platform to more efficiently report to growers, including over 40 sites across the state. Weekly blog posts alerted growers in real time of the presence of SWD.

In addition, we evaluated different trap types for efficacy and ease of use over two seasons. Both Scentry jar (drowning) traps and Trécé red sticky cards, baited with their respective lures, were deployed at berry or cherry plantings across New York State. At each site, two of each trap type were placed along the edge, spaced 50 meters apart. Traps were monitored weekly throughout the season and the number of SWD recorded. In 2022, jar and sticky trap detection dates were the same at 6 of 19 locations (31.6%), jar traps earlier at 9 (47.4%), and sticky traps earlier at 2 (10.5%). In 2023, detection was the same for 5 of 17 locations (29.4%), jar traps earlier at 8 (47.1%), and sticky traps earlier at 3 (17.6%). Our results indicate that both trap types provide similar detection, offering options for growers.

P36 • Poster submission withdrawn.

P37 • Incidence of *Campoletis chlorideae* Uchida (Hymenoptera: Ichneumonidae)

on *Spodoptera frugiperda* (J. E. Smith); Adhikrao Jadhav

Campoletis chlorideae Uchida is a renowned biocontrol agent for *Helicoverpa armigera* (Hubner) and other lepidopteran insects. It has also been observed to parasitize *Spodoptera frugiperda* (J. E. Smith). The study was conducted in Karveer taluka of Kolhapur district, Maharashtra, India across the winter season (2018), summer season (2019), and monsoon season (2019) to assess the prevalence of *Campoletis chlorideae* in maize. During the winter season of 2018, the highest percentage of parasitism (91.78%) was recorded on the 47th SMW in November 2018. In the summer season of 2019, the highest percentage of parasitism (64.38%) was observed on the 9th SMW in March 2019. The highest level of parasitism, reaching 85.11%, was recorded on the 29th SMW (July 2019) during the monsoon season of 2019. The level of parasitism exhibited a significant correlation with both the maximum and minimum relative humidity, showing a positive correlation. Conversely, a significant inverse relationship was observed with the maximum temperature.

P38 • RNA Interference as a strategy to manage *Neopestalotiopsis* species in strawberry; Melanie Kalischuk

Recently, there was an epidemic in the eastern portion of North America involving an aggressive species of *Neopestalotiopsis* that caused catastrophic consequences to the strawberry industry. Currently, there are few integrated pest management options for this devastating disease. From 2020 to 2022, commercial fields across Ontario were monitored for *Neopestalotiopsis*-like disease symptoms. The survey revealed 31% of all samples tested positive for *N.* spp. and of this, 90%, 4%, and 6% were identified as aggressive species, *Neopestalotiopsis rosae* and a new unidentified species within the genus, respectively. RNA interference (RNAi) was used to evaluate differences in response of these species to the cytochrome P450 paralogues CYP51A, CYP51B and mixture CYP51AB. CYP51B and CYP51AB provided the most effective RNAi responses to the aggressive species and *N. rosae*. These targets provided 15% and 13% inhibition rate relative to the empty vector RNAi negative control for three days post pathogen inoculation for the aggressive species and *N. rosae*, respectively. RNA interference against the new species was most effective with CYP51AB. This target provided a 15% inhibition rate relative to the empty vector RNAi negative control for five days post pathogen inoculation. The overall RNAi responses at the end of the experiment provided pathogen inhibition rates of 39%, 47%, and 46% for the aggressive species, *N. rosae*, and new species, respectively. Further optimization of this platform will lead to RNAi preventative methods that can be utilized to reduce the impact of this emerging pathogen and offer alternative options to manage this destructive Neopestalotiopsis disease.

P39 • Shaping sustainable food systems: Retailers' adoption of IPM to protect pollinators and biodiversity; Rory Tevlin

Pollinators are crucial to global food security, with nearly 75% of major crops depending on them. However, pollinator populations face significant threats, including climate change, pesticide use, and habitat loss.

With growing consumer, NGO, and stakeholder concerns about pollinator decline and the risks associated with pesticide use, food retailers are responding by implementing pollinator protection within supply chain policies—particularly through Integrated Pest Management (IPM) practices.

This poster will explore the IPM certification requirements set by major retailers to safeguard pollinators and biodiversity. Leading retailers like Walmart, Whole Foods Market, Kroger, and Giant Eagle are requiring fresh produce suppliers to adopt IPM practices, verified through third-party certifications, by 2025. In August 2021, Walmart became the first retailer to publicly commit to a policy and certification requirement, initiating a broader trend among the other retailers.

Each retailer's policy provides an accepted list of certifications, and while many are recognized by all four retailers, there are key differences to reflect each policy's unique criteria. Policies also encourage—but do not always require—the phase-out of high-risk pesticides like neonicotinoids and chlorpyrifos.

This poster will highlight the overlap in certification requirements, explain the role of IPM in minimizing pesticide risks to pollinators, and illustrate how, and why, retailers are leveraging IPM to protect biodiversity while maintaining food production sustainability. With increasing consumer demand for sustainable practices, these retailer policies signal an important industry-wide shift in how agricultural supply chains address environmental risks and promote pollinator health.

P40 • The SERA3 IPM priority document: A decade of identifying regional IPM priorities; Ryan Adams

The Southern Region Information Exchange Group for IPM (SERA3) is part of the multistate research program whose mission is to enable efficient and comprehensive research on high-priority topics. SERA3 brings together IPM research and Extension professionals on an annual basis to exchange innovative IPM research and Extension knowledge. SERA3 also provides leadership for the development of IPM priorities for the Southern region. These priorities are published on an annual basis and highlight IPM research and Extension needs in the region. The criteria for the selection of IPM priorities are a) strong stakeholder identified need, b) address economic,

environmental, and/or human health issues, and c) relevant in two or more states or territories in the Southern region. The priority list is developed by SERA3 and then distributed to IPM stakeholders throughout the region via an online ranking survey. Survey results are then aggregated and normalized to create the top regional priorities for that year. The SERA3 IPM priority document is published on the Southern IPM Center's website.

P41 • Bottom-up effects from flooding modulate plant-aphid-parasitoid interactions; Margaret Lewis

Abiotic climate stressors can modulate tritrophic interactions in myriad ways. Climate-driven shifts in host plant quality often influence insect herbivore fitness. In addition to directly impacting pest population dynamics, these changes sometimes extend to natural enemies through shifts in the availability or quality of prey items. Using soybean aphids (*Aphis glycines*) as a model system, we investigated how one abiotic stressor associated with global climate change, flooding, alters tritrophic interactions between aphids, soybeans, and a parasitoid wasp (*Aphidius colemani*). Greenhouse experiments were conducted using two soybean aphid populations: a virulent biotype that is adapted to survive on aphid-resistant soybean varieties and an avirulent biotype that is susceptible to aphid-resistant soybean. Overall, flooding negatively impacted avirulent aphid fitness only. We observed decreased fecundity and population growth rates in avirulent aphids when they were reared on flooded soybean, while virulent aphids exhibited no phenotypic response to flooding, a fitness differential that could facilitate the spread of virulence as climate change effects intensify. Flooding also impacted parasitoid wasp performance. No differences in mummy formation rates were observed across any treatments, but adult parasitoid emergence rates and female wasp sex ratios were higher from aphid mummies on flooded soybeans, regardless of aphid biotype. These results highlight the potential for host plant water stress to alter soybean aphid population dynamics in complex ways. Enhanced parasitoid performance under flooding conditions may improve aphid suppression, although further work will be necessary to directly link parasitoid-host interactions with changes to aphid population dynamics.

P42 • Use of entomopathogenic nematodes for western corn rootworm control and potential impacts on non-target predators; Ana Lima

The western corn rootworm (WCR), *Diabrotica virgifera virgifera*, is one of the most destructive pests of corn in North America. WCR control includes crop rotation, transgenic corn, and soil-applied insecticides. However, this pest can develop resistance to these methods. Therefore, additional control strategies,

including biological control, should be considered. Entomopathogenic nematodes (EPN) could be an approach to control WCR; however, it is important to study their potential effects on non-target organisms. In this study, we assessed the potential of EPNs for controlling WCR and their impact on its predators. A mix of two species of EPNs, approximately 18 million infective juveniles per acre of *Heterorhabditis bacteriophora* and *Steinernema feltiae*, was applied to plots planted with *Bt* and non-*Bt* corn. Soil samples were taken before and after EPN applications to assess their establishment in the field; nematodes recovered from white traps were identified by molecular sequencing. The emergence and feeding damage of WCR and the diversity and abundance of predatory arthropods were assessed. The application of EPNs did not reduce the number of WCR adults or root damage; however, these parameters did differ between *Bt* and non-*Bt* corn. Despite variations throughout the crop season, no effect of EPNs on the population of predatory arthropods was observed. This study will be repeated in the second and third year to better understand the establishment of EPNs and their effects against WCR and non-targets predators, to better evaluate the use of EPNs as a long-term approach for WCR management.

P43 • Idaho pest monitoring networks; Desiree Wickwar

Pest monitoring programs play a crucial role in helping agricultural producers and homeowners move away from calendar-based pesticide applications. By providing accurate, timely, and location-specific data on pest presence and activity, these programs allow for better timing of pest control applications, which can reduce unnecessary pesticide use and improve pest management efficacy. In Idaho, several pest monitoring networks support Integrated Pest Management (IPM) efforts by providing stakeholders with actionable information and specialist guidance. Key programs, such as the PNW Pest Alert Network and the Idaho Pest Monitoring Dashboard, offer real-time data to guide pest management actions, contacting nearly 5000 individuals each year. Monitoring programs support decisions in the state's top crops such as potatoes, sugar beets, cereals, and legumes, while also providing information on urban pests. Stakeholders routinely report that they use these monitoring networks to inform their pest management (80%) and see reduced pesticide applications (34%) as a result of participation in these pest monitoring programs. This poster will report on key findings and impacts of Idaho pest monitoring programs, highlighting finds and impacts from potato psyllid and zebra chip disease monitoring.

P44 • Biosolarization, cover crops, & conservation tillage: evaluating IPM tactics in organic vegetables; Dwayne Joseph

Effective weed management in vegetable production often requires strategies tailored to control weeds both within and between crop rows. This study evaluated

different approaches for each area, utilizing red clover as a living mulch (LM) for weed suppression between rows in combination with three strategies for in-row management: strip tillage, a cereal rye cover crop as a dying mulch, and biosolarization. Biosolarization, a soil disinfection technique, has been shown to increase weed seed mortality and reduce soil pathogens. Our objectives were to assess the efficacy of biosolarization, conservation tillage, and cover cropping to 1) reduce pest pressures (weeds and insects), and 2) enhance crop yield. The study, conducted on organically managed okra and summer squash at the Central Maryland Research and Education Center, Upper Marlboro, MD, included four treatments with four replicates each. Okra and summer squash were grown in: 1) a red clover living mulch with no-till (LM-NT), 2) a strip-rotovated row interplanted with cover crops (LM), 3) solarized soil (Sol), and 4) biosolarized soil interplanted with cover crops (Biosol). Results showed that weed totals were significantly affected by treatment and row position (within or between row). The LM-NT treatment provided the most effective weed control between rows, while Biosol demonstrated the best within-row weed suppression. These findings suggest that biosolarization, with its ability to reduce weed seed viability and emergence, can be a valuable tool for within-row weed management. In organic production, integrating biosolarization with complementary practices, such as living mulches, offers a promising strategy for achieving effective weed control.

P45 • Increasing stakeholder knowledge for improved cucurbit virus management in the United States;

William M. Wintermantel

Virus diseases impact cucurbit production throughout the United States (U.S.) and world, reducing fruit quality and producer profits. During the past 25 years, cucurbit viruses have been introduced into and spread throughout the U.S. at an alarming rate, and most production areas are now impacted by numerous viruses, which often occur in mixed infections, complicating management. Integrated pest management is critical for cucurbit virus management and begins with knowledge of virus threats, epidemiological factors that influence disease development, and effective management methods. Increased stakeholder knowledge and information exchange throughout the U.S. cucurbit industry is necessary to improve virus disease management, including limiting virus spread. The Emerging Viruses in Cucurbits Working Group (EVCWG) was established in 2022 "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 United States." EVCWG members meet regularly to identify existing cucurbit virus threats, risk factors for virus establishment and spread, and actions necessary for improved virus mitigation, including research, development of diagnostic assays, and outreach. Stakeholder education and information distribution and exchange are achieved through the maintenance of an EVCWG website, eCucurbitviruses.org,

production of fact sheets and other educational resources (e.g., postcards and videos), delivery of presentations to stakeholders, and hosting of webinars and open meetings. These efforts to unify and improve virus management across the cucurbit industry will help safeguard sustainable cucurbit production in the U.S. and strengthen the cucurbit industry in the U.S. and throughout the world.

P46 • Weed management tradeoffs in organic squash; Bryan Brown

Weed management in organic winter squash is often challenging because of the long growing season. Many growers use mechanical cultivation or plastic mulch. Smaller farms sometimes use loose mulches such as straw to suppress weeds. And New York farmers were interested in the potential use of roller crimped cereal rye as mulch. We tested these four strategies in a side-by-side systems comparison in 2021 and 2022. Weed management was effective in all but the rolled rye treatment. Levels of powdery mildew, aphids, beneficial insects, squash bugs, and striped cucumber beetles generally followed yields, with larger plants supporting higher pest levels. But the straw mulch treatment trended toward less powdery mildew and more squash bug incidence. Pitfall trapping found the most ants in rolled rye and cultivation treatments. Carabids and harvestmen were found in greater numbers in the cultivation treatment. Rove beetles were greatest in plastic mulch. And rolled rye contained the most slugs and spiders. Subplots sprayed with organic insect and disease protectants following IPM thresholds had minimal effects on pest levels and pitfall trap results, but did significantly improve marketable yields. Total yield and marketable yield were greatest in the plastic mulch treatment followed by cultivation and straw mulch. Rolled rye resulted in unacceptable yields. Labor and materials costs were greatest for the straw mulch system. Net profits were greatest in the IPM subplots of the plastic mulch and cultivation treatments.

P47 • Educating Californians on invasive species and public health pests in urban areas; Karey Windbiel-Rojas

In California, nearly 95% of the population lives in urban or suburban areas. It is inevitable that they will encounter pests, especially those of public health significance such as cockroaches, rats, bed bugs, and mosquitoes, some of which may also be considered invasive. It is also likely that many will choose to manage these pests themselves using pesticides or hire a company to manage them.

The Urban & Community team with the University of California Statewide IPM Program (UC IPM) works to educate urban audiences as well as the professionals they may hire, on integrated pest management (IPM). In 2024, the program focused outreach and educational efforts on invasive species, public health

pests, and pesticides to safeguard the health and wellbeing of urban Californians and protect our ecosystems.
In 2024 the UC IPM program provided

Training for UC Master Gardener volunteers on IPM, public health pests, invasive species, and pesticides

Training for retail nursery and garden center employees on invasive species, pesticides, and IPM

Monthly webinars for the public covering topics ranging from biological control to invasive species. These webinars were recorded and are available on the UC IPM YouTube channel.

Webinars and other training activities for landscapers, school grounds crews, public housing and structural pest management professionals on public health pests and invasive species

Invasive pest online courses in collaboration with UC Statewide Master Gardener program

Six issues of newsletters for the public and for pest management professionals covering timely pest management topics including invasive pest spotlight articles

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P48 • Extension IPM engagement for community urban agriculture spaces; Jacqueline Kowalski

As urban agriculture grows, so do unique integrated pest management challenges, particularly in light of climate change. Urban agriculture spaces such as community farms often support various types of programs with multiple stakeholder groups working on the piece of land. Some of these programs include community gardens, youth training programs, and/or farm incubator programs. Different entities have different motivations, thresholds for pest damage, and philosophies on managing pest and disease issues. This poster will discuss various strategies Extension professionals can provide technical support such as demonstration areas, on-farm research, presenting information on the use of weather data for decision-making, pesticide safety education, and assistance with developing IPM site plans.

P49 • Meeting IPM needs in a highly urbanized New England state; Jacqueline Kowalski

Connecticut is a densely populated, geographically small, highly urbanized New England state with a modestly sized Extension system that does not receive county funding. This situation raises the question of how to meet the population's Integrated Pest Management (IPM) needs with limited capacity. This poster describes how the University of Connecticut IPM Team approaches this work by developing meaningful, trusted partnerships that advance regional and national IPM goals and through strategic projects with local, regional, and national impact. Some examples of this work include

Collaboration with the Federally Recognized Tribes Extension Program (FRTEP), a partnership with the Mashantucket Pequot Tribal Nation (MPTN), to increase food security and encourage appropriate pest management strategies.

Development of the Native Plant Availability Guide, created through a partnership with the Connecticut Department of Energy and Environmental Protection's Division of Wildlife, which helps professionals and residents locate native plant material from CT retail and wholesale nurseries.

Participation in multi-state urban farm trapping networks to create better tools for urban pest management.

Development of short courses for targeted populations such as greenhouse growers, turf managers, and fruit/vegetable growers.

The UConn Integrated Pest Management (IPM) Program is a collaboration between the Department of Extension and the Department of Plant Science and Landscape Architecture. Since its inception in 1980, the UConn IPM Program has made great strides in developing and implementing sustainable methods for pest control throughout Connecticut.

P50 • Evaluation of celery breeding lines and commercial cultivars for resistance to *Fusarium oxysporum f.* sp. apii race 2 and race 4; Christopher Greer

Fusarium wilt of celery, caused by the soil-borne pathogen *Fusarium oxysporum f.* sp. apii (*Foa*), has been a persistent challenge for celery growers in California. Two races of the pathogen are documented in California. *Foa* race 2 is widespread throughout celery-growing regions of California, typically causing yellowing and stunting of established plants, resulting in failure to produce marketable heads. *Foa* race 4 was identified in Ventura County in 2013 and by 2022 had displaced race 2 as the predominant race causing celery losses in Ventura County. *Foa* race 4 is more aggressive than race 2, often causing plant stunting and death within weeks after planting, especially when temperatures are high. Field trials to evaluate resistance were conducted in two coastal California locations naturally infested with *Foa*: Santa Maria (race 2) and Camarillo (race 4). At Santa Maria in 2022, there was minimal plant mortality, but most entries exhibited some stunting and vascular symptoms in roots and crowns. Many entries did not produce marketable celery due to stunting. Entries exhibiting the lowest disease severity produced the heaviest stalks with the longest petioles. At Camarillo in 2022, there was rapid disease development of *Foa* race 4 induced symptoms. Six weeks after planting, 23 of 42 entrees exhibited 80-100% plant mortality. However, five entries had disease severity scores of 1.0-1.5 and less than 15% mortality. These more tolerant lines produced marketable celery. These results contribute to the development of *Foa*-resistant breeding lines and inform growers about the

performance of cultivars in local conditions.

P51 • Integrated pest management of crape myrtle bark scale; David Held

Since the first detection in Texas 10 years ago, crape myrtle bark scale has spread to many states including Alabama. Our program has investigated conservation biological control, pollinator impacts, ecological impacts, and alternative chemical controls. This work has identified that systemic insecticides created hazardous conditions for pollinators foraging in flower in the first bloom after application. The use of limonene and visual attractants for lady beetles provide alternatives to systemic insecticide applications.

P52 • A New Paradigm: Expanding NEWA into microclimates, remote sensing, and accessible IPM; Daniel Olmstead

For decades, the Network for Environment and Weather Applications (NEWA) has provided farmers with data-driven insights to support sustainable pest and crop management. Now, NEWA is evolving its mission to extend beyond traditional agriculture and embrace opportunities in underserved communities, urban agriculture, and emerging industries. This expanded vision includes innovative applications in remote sensing, microclimate monitoring, and accessible technology, all aimed at making pest management information more widely available. In collaboration with startups and technology partners, NEWA is poised to develop scalable tools that bridge the gap between advanced weather data and the practical needs of diverse growers. These business partnerships will position NEWA as an incubator for emerging technologies that improve forecasting, resource management, and resilience to climate variability. Looking ahead, NEWA is committed to making these tools accessible to historically underserved communities, fostering a more resilient and adaptable agricultural landscape across New York and beyond. By broadening its scope, NEWA will empower a wide range of growers with locally relevant and practical pest management resources that support sustainable practices and community resilience.

P53 • Augmentative biological control for squash bug (Hemiptera: Coreidae) using inoculative field releases of egg parasitoid, *Hadronotus pennsylvanicus* (Hymenoptera: Scelionidae); Sean Boyle

The squash bug, *Anasa tristis* (De Geer) (Hemiptera: Coreidae), is a serious pest of cucurbit crops across the US. Biological control of *A. tristis* is largely understudied,

specifically the potential of natural enemy, *Hadronotus pennsylvanicus* (Ashmead) (Hymenoptera: Scelionidae), as an augmentative biological control agent. Recent evaluations suggest early season inoculative field releases of *H. pennsylvanicus* can increase A. tristis egg parasitism during the peak ovipositional period of the target pest. However, critical knowledge gaps in *H. pennsylvanicus* ecology and field release procedures need to be addressed to accurately determine the parasitoid's viability as an effective biocontrol agent. In a two-year study, we released *H. pennsylvanicus* at three different rates in zucchini fields colonized by squash bugs to assess the impact of varying parasitoid density on squash bug egg parasitism. Weekly squash bug sampling was also conducted to compare pest densities, particularly nymphs per plant, between treatments. Significant differences in parasitism rates were observed among release rate and control (no parasitoids released) treatments, with wild-laid egg masses exhibiting higher rates of parasitism than deployed sentinel egg masses. However, no statistical differences between squash bug life stage densities were found. Our work not only offers insight on *H. pennsylvanicus* as an augmentative biocontrol agent for squash bug but may also hold value for future biological programs targeting other pestiferous leaffooted bug species in the US and around the world.

P54 • Assembling a new pumpkin crop and pest management resource; James Jasinski

The United States pumpkin crop, encompassing both jack-o-lantern and processing varieties, covers 99,413 acres and is valued at over $286 million (Agricultural Census 2022). Nine of the 13 largest pumpkin-producing states are in the Midwest, Northeast, Mid-Atlantic, and Southeast regions. A new 72-page pumpkin production guide, created by 13 specialists from Ohio State University, Michigan State University, and Cornell University, compiles the latest research and demonstration trials to promote modern production techniques and integrated pest management (IPM) practices. The guide includes chapters on mechanical weed control, cover crop strategies, pollinator protection, and the potential negative interactions of specific pesticide combinations, such as fungicides and insecticides. It also addresses fundamental topics like weed, insect, and disease management, identification, and the role of beneficial natural enemies in production fields. A pumpkin enterprise budget is included to help growers assess profitability. Additional features include 176 full-color images, accessible explanations, and 92 QR codes linking to supplementary resources such as factsheets, bulletins, websites, and videos from experts nationwide. Although tailored for growers in the Midwest, its principles are broadly applicable to those in the Northeast, Mid-Atlantic, and Southeast. This publication may also serve as a model for future crop-specific guides.

P55 • Regional variability in waterhemp seedling emergence:

Influence of tillage practices and cereal rye cover crop; Ahmadreza Mobli

Understanding weed emergence patterns is crucial for implementing timely and effective control measures, ensuring interventions target weeds at their most vulnerable stages. This is particularly critical for managing waterhemp (*Amaranthus tuberculatus*), a problematic weed with an extended emergence window throughout the growing season. This study examined the effects of tillage practices and cover crop integration on the temporal and spatial emergence patterns of waterhemp across a latitudinal gradient, including Wisconsin, Illinois, Arkansas, and Texas. We hypothesized that tillage practices and the use of cereal rye (*Secale cereale*) as a cover crop would influence waterhemp seedling emergence. The study, conducted in 2023 and 2024, used a split-plot design with three main tillage treatments: (1) fall tillage followed by spring tillage, (2) fall tillage only, and (3) no-tillage, combined with subplot treatments of cereal rye versus fallow. Preliminary results from 2023 showed that fall tillage followed by spring tillage encouraged earlier and more rapid waterhemp emergence, while cereal rye extended the emergence period. Regional variations were observed in the effects of tillage. In northern regions (Wisconsin and Illinois), fall tillage facilitated gradual and consistent emergence. In southern regions (Arkansas and Texas), it delayed emergence and concentrated it into a shorter timeframe, especially without cereal rye. No-tillage combined with cereal rye significantly delayed emergence and expanded the emergence window across a broader range of growing degree days (GDD), particularly in southern locations. Overall, cereal rye reduced waterhemp emergence in most locations, with the exception of Wisconsin. These findings demonstrate that integrating tillage practices with cereal rye cover crops can effectively modulate waterhemp emergence patterns, offering region-specific strategies for improved control. Future research should explore the long-term effects of these practices on waterhemp seed viability and emergence dynamics.

P56 • Evaluation of field corn herbicide programs with and without atrazine; Michael Hunter,

The Environmental Protection Agency (EPA) has proposed mitigation measures to reduce the risks of atrazine runoff to aquatic plant communities. These measures include restrictions on application timing and rates, as well as lowering the maximum allowable use rates in field corn. Atrazine has been a cornerstone of preemergence weed control in New York field corn, where growers have traditionally used rates higher than those proposed in the EPA's anticipated label changes. This poses challenges for no-till and reduced-tillage systems, which rely heavily on herbicides for early-season weed management. There is uncertainty about whether reduced rates of atrazine—or omitting it altogether—can provide effective weed control without increasing costs or compromising

efficacy. This multiyear, on-farm research trial evaluated corn herbicide programs with and without atrazine. Treatments included Acuron Flexi, Harness MAX, Resicore XL, and Verdict plus Outlook. Each site featured an untreated control and 16 herbicide programs combining preemergence (PRE) herbicides at various rates, including atrazine-free options. Herbicide rates were adjusted based on soil texture and organic matter. All field sites were tilled, and treatments were applied within three days of planting. Two years of data from three farm locations demonstrated that excellent corn weed control was achievable regardless of atrazine rates or its inclusion. These preliminary results suggest that corn growers could potentially reduce input costs and chemical usage without compromising weed control efficacy. Confidence in these findings will increase with further testing across additional years and locations.

P57 • Developing IPM extension resources for small-scale farms; Shufang Tian

Small-scale farms are a vital component of California's agricultural landscape. According to the USDA 2022 Census of Agriculture, 69% of the state's 63,134 farms are small family operations with annual sales under $100,000. These farms face unique challenges in pest management, compounded by language barriers, as many farmers have limited English proficiency and speak languages such as Spanish, Hmong, Iu Mien, Chinese, and Korean. Our project, a collaboration between UC IPM and UC Small Farms, aims to address integrated pest management (IPM) priorities and develop extension methods tailored to historically underserved small farmers. Key topics include basic IPM principles, pest identification, pesticide safety, and updates on government and state regulations. Additionally, we will create training materials to help farmers prepare for the required retesting of the Private Applicator Certificate. Extension resources will include fact sheets, blogs, newsletters, infographics, and videos, all produced in multiple languages to meet the diverse needs of California's farming communities. The project's outcomes will promote the adoption of IPM practices, helping small-scale farmers manage pests safely, effectively, and sustainably.

P58 • Effect of plant extract *Ruta chalepensis* against the whitefly, *Bemisia tabaci* (Homoptera: Aleyrodidae), at Biskra oasis, Algeria; Tarai Nacer

To reduce the impact of chemical insecticides on greenhouse pests, a study was conducted at the Biskra oasis targeting the whitefly *Bemisia tabaci* (Homoptera: Aleyrodidae), one of the most destructive pests affecting greenhouse tomato crops. The study evaluated the efficacy of *Ruta chalepensis* (Rutaceae) plant extracts applied on the first, second, and sixth days of treatment. Three types of extracts were tested: seed extract, seed oil extract, and

dry leaf extract, each at three concentrations (0.25, 0.5, and 1.0 ml/ml). The extracts were applied to various larval stages and adult whiteflies under laboratory and field conditions during the autumn and winter of 2023. The results showed that mortality rates increased with higher extract concentrations, particularly in the first and second larval stages. These findings suggest that *Ruta chalepensis* extracts have potential as an effective, environmentally friendly alternative for controlling *B. tabaci* in greenhouse tomato production.

P59 • Rebuilding an IPM program in highbush blueberries after invasion by spotted-wing drosophila; Rufus Isaacs

Since the first detection of spotted-wing Drosophila (*Drosophila suzukii*, Diptera: Drosophilidae) in Michigan, the pest has disrupted existing integrated pest management (IPM) programs, particularly through the increased use of chemical controls to protect blueberries. To address this challenge, collaborative efforts have been undertaken to develop tools that minimize the impact of this invasive insect across affected crops. These efforts encompass chemical, cultural, biological, and genetic management approaches, each at varying stages of development—from widely adopted practices to experimental techniques. This poster highlights our program's research aimed at developing and implementing sustainable management strategies for *D. suzukii*. Our focus is on reducing reliance on insecticides while enabling growers to meet market quality standards. Key advancements include recent inundative releases of figitid wasps as biological control agents, assays to detect pesticide resistance and associated genetic markers, and the development of a fruit sampling method to guide pesticide spray decision-making.

P60 • Enhanced IPM tool: Utilizing native resistance in managing caterpillar pests in corn-cotton agroecosystems; Megha Parajulee

Over the past 30 years, integrated pest management (IPM) strategies for corn have relied heavily on Bt technology, supplemented by insecticide applications, with minimal investment in native resistance. Genes from the wild relative *Tripsacum* offer an opportunity to expand the genetic diversity of U.S. corn production and introduce native resistance to insects and diseases absent in cultivated corn germplasm. Native resistance has the potential to enhance the effectiveness of Bt genes and extend the lifespan of Bt technology. A three-year study was conducted to develop an improved IPM strategy, transitioning from a Bt-centered approach to a more sustainable IPM framework for corn production in a corn-cotton agroecosystem. The study evaluated 10 corn hybrids, representing four resistance modes: Native-Resistant, Native-Susceptible, Native-Resistant + Bt, Native-Susceptible + Bt, and two commercial checks. Hybrids were planted

adjacent to a cotton field in a split-split-plot randomized design, with irrigation water levels as the main plot factor, native resistance as the subplot factor, and Bt resistance as the sub-sub-plot factor, replicated three times. Leaf-feeding damage from fall armyworm was assessed using the Davis et al. (1992) 1–9 scale, where 1 indicates no damage and 9 represents severe damage with whorls and furls mostly destroyed. The study characterized the expression of *Tripsacum*-derived native resistance against fall armyworm, quantified the combined effects of native resistance and Bt traits on reducing leaf damage during vegetative growth, and measured reductions in mycotoxin accumulation in grains under diverse production conditions in the Texas High Plains. This research aims to empower producers with strategies to optimize resource inputs and achieve sustainable field crop production.

P61 • Influence of plant growth promoting microbes on root rot management and growth performance of Asterix potato under field condition;

Rawish Zehra, rawishzehra@gmail.com

Numerous chemical pesticides are employed to manage plant diseases that affect the crop's nutritional value as well as environment. Plant growth-promoting microorganisms (PGPM) are secure and efficient alternatives for managing root rot infections. This study aimed to examine how various plant growth-promoting microorganisms (PGPM) affect the prevention of root rot disease in potato plants. The application of growth promoting microbes (PGPM) enhanced the systemic resistance of plants against root rot pathogens by enhancing antioxidant molecules in field plot trials. In comparison with untreated control plants, they significantly decreased the infection caused by *Macrophomina phaseolina, Rhizoctonia solani, Fusarium solani,* and *Fusarium oxysporum*. Free radical scavenging activity and total phenol levels were considerably improved by (PGPM) isolates that ultimately increased potato tuber production. Pseudomonas and Trichoderma species were found more effective in plant growth and tuber production compared with untreated control plants and plants treated with Carbendazim, a commercial fungicide. This research will help to make an impact on the production of potatoes in a sustainable way.

Poster and Infographic Competition

P62. Real-time mapping of phenology and climate suitability for spotted lanternfly (*Lycorma delicatula*)

Jules Beyer; Poster, Bachelors

An improved understanding of both when and where to expect invasive species can support early detection programs and other efforts to control invading populations. We developed and evaluated the predictive performance of a model for spotted lanternfly (SLF), *Lycorma delicatula*, for use in the DDRP (Degree-Days, Risk, and Pest event maps) platform. DDRP is a spatial modeling platform that was designed to produce timely predictions of the phenology and risk of establishment (based on climatic suitability) of invasive insect pests. We are using DDRP to produce regularly updated forecasts for 18 invasive insect species including SLF for the continental U.S., available at http://uspest.org/CAPS. The primary objective of this study is to provide decision-makers with accurate and timely forecasts of the appearance of SLF nymphs and adults to help guide decision-making related to surveillance and management. We used thousands of occurrence records and phenological observations to validate the model. Overall, the model exhibited strong performance. Climate stresses were insufficient to exclude SLF from most of the U.S.; however, an inability for SLF to complete its life cycle may reduce the likelihood of establishment for cooler areas. Forecasts for SLF are also available at the USA National Phenology Network at https://www.usanpn.org/data/forecasts, where end-users may submit phenological observations to help us further improve the model.

P63. Adoption of IPM Technology Among Groundnut Farmers in Bangladesh: The Influence of Sociodemographic Factors, Risk Attitudes, and Social Learning

Nandini Das; Poster, Doctorate

This project evaluates the impact of training 200 groundnut farmers with integrated pest management (IPM) technology in groups of 10 in rural Bangladesh, an area prone to adverse climate shocks. We examine the adoption patterns of IPM technology by farmers based on their sociodemographic characteristics in a quasi-Randomized Controlled Trial (RCT) setting using rigorous econometric analysis. There were several components of this intervention: there were a number of activities to be carried out early in the season (like using trychocompost during land preparation) while other activities (like using pheromone traps and lures) were to be carried out later in the season. Having several components in the IPM package leaves space for various levels of adoption. In addition to evaluating the impact of the IPM practices, we explore the factors

influencing the decisions associated with the stages of the adoption process. We also study the farmers' risk preferences: The level of IPM adoption would depend on the farmer's human capital, local agroecological and socioeconomic conditions, and the unpredictable effectiveness and optimal usage of new technologies, which may lead to uncertainties in future earnings, market prices, and risks associated with weather and pest-related challenges. Hence, farmers' risk attitudes can play a huge role in technology adoption decisions and the degree to which IPM technology gets adopted. We also study the social learning and peer effects that play a crucial role in technology adoption.

P64. Integrative management approach to combat the wheat stem sawfly in the Great Plains of North America

Henrique Vieira; Poster, Doctorate

Wheat stem sawfly (WSS), *Cephus cinctus* (Hymenoptera: Cephidae), is a native grass-feeding insect and one of the most important pests of wheat in North America. In 2023, WSS have caused an estimated $40 million loss in Colorado winter wheat production. After over a century dealing with WSS, research indicates that an integrative approach is necessary for management. This presentation will display two objectives. Firstly, we used thirteen years of data on temperature, rain, and snowfall from northwestern Colorado to estimate emergence and flight peak, and further use this phenology model to potentially enhance efficacy of existing control methods. Analyses were made using Generalized Additive Mixed Models (GAMM). The results generated coefficients on Degree-Day accumulation (heat units) necessary to trigger WSS important biological events to be incorporated in this insect pest management. For the second objective, we evaluated a possible plant defense mechanism of herbicide tolerant wheat cultivars (Clearfield technology) that are potentially associated with a non-preference aspect of WSS. We collected data on WSS oviposition preference of seven cultivars, that included a susceptible hollow stem cultivar – Byrd – as our negative control, a solid stem cultivar – Amplify – as our positive control, and three different herbicide tolerant cultivars containing the Clearfield technology. Preliminary results indicated that some of the Clearfield cultivars presented reduction in oviposition when compared to the susceptible cultivar. Further, the results of the different approaches presented will be used to guide decisions that can help suppress the populations of this increasingly destructive insect pest.

P65. Exploring *Tolypocladium inflatum* for biocontrol: Pathogenic impact on Cowpea aphid, *Aphis craccivora*

Aditya Singh Ranout; Poster, Doctorate

The cowpea aphid, *Aphis craccivora*, is a significant pest that impacts various economically important crops, resulting in substantial output reductions due to direct feeding damage and the spread of plant viruses. Given the growing apprehensions over the ecological consequences and the emergence of resistance linked to chemical pesticides, there is an urgent need for alternate pest management approaches. This research assesses the pathogenicity of *Tolypocladium inflatum*, an entomopathogenic fungus, towards *A. craccivora* in a controlled laboratory setting. Bioassays were performed to evaluate the virulence of various concentrations of *T. inflatum* viz. 1 x 105, 1 x 106, 1 x 107, 1 x 108, and 1 x 109 conidia/ mL against nymphs and adults of *A. craccivora*. The results demonstrated considerable aphid mortality in the treated groups, with elevated concentrations of *T. inflatum* exhibiting enhanced mortality rates. According to the probit analysis, *T. inflatum* was found to be more virulent against adults (LC50=6.3 x 105 conidia/ mL) than nymphs (LC50=4.9 x 107 conidia/ mL). Microscopic analyses verified that the fungal infection was the cause of death, with mycosis detected on aphid carcasses. The results indicate that *T. inflatum* may serve as an effective biocontrol agent against *A. craccivora*, presenting a valuable element for integrated pest management (IPM) strategies designed to diminish reliance on chemical insecticides. Although, additional research is required to assess the field efficacy of *T. inflatum*.

P66. Understanding growers' needs in achieving integrated pest management certification

Madison Love; Poster, Masters

In response to declines in global pollinator populations, major retailers, notably Walmart Inc., have launched initiatives to improve pollinator health and biodiversity. These programs require suppliers of fresh produce, cut flowers, and live plants to be certified by third parties for implementing integrated pest management (IPM) programs. With certification deadlines as early as 2025, growers face increasing pressure to meet these standards. To better understand growers' needs in the certification process, the Center for Integrated Pest Management (CIPM) launched a pilot program in 2023, partnering with a local bulb and cut flower grower to support their efforts in applying for the Bee Better Certified (BBC) program, offered by the Xerces Society. CIPM conducted interviews and on-site visits with farm managers to gather comprehensive data on the farm's IPM practices and pollinator habitat. Findings revealed that growers often lack the detailed IPM records required for certification and have limited knowledge of pollinator health and ecology. Furthermore, access to targeted resources and support to enhance or protect

pollinator habitat in the southeastern U.S. is somewhat limited. Additional interviews with third-party certification bodies and the BBC Program Lead highlighted that local consulting assistance significantly improves application quality and expedites the application process. Looking forward, CIPM plans to expand the pilot program to include additional North Carolina growers and establish statewide consulting services. These efforts aim to equip growers with the knowledge, skills, and resources needed to enhance pollinator habitat and strengthen IPM programs.

P67. Cover cropstacle course: fantastic K-12 extension success story

Madeline Henrickson; Poster, Doctorate

Cover crops play a crucial role in IPM by supporting ecosystems. Communicating these concepts to K-12 audiences can be challenging, so a hands-on obstacle course demonstrating erosion was created, with 11 students participating during Experience Extension 4-H Day Camp. Prior to the program, 30.48 cm^3 sections of soil with cereal rye cover crop, and soil with conventional tillage were removed from experimental plots. The session began with presentations on plant health and cover crops. Participants were then divided into two teams to compete in a relay race obstacle course, receiving either "cover crop" or "conventional tillage" starting soil. The goal of the relay race was to maneuver soil samples through obstacles while retaining maximum soil. Tarps were placed underneath the course to collect dislodged soil. Using 7.62 cm handheld fine mesh strainers, participants scooped and navigated soil samples through erosion stations. Wind erosion was simulated via high-velocity fans, requiring participants to toss and catch their sample three times. Water erosion was simulated by positioning samples over catch basins and popping a water balloon overtop. Participants dumped their remaining samples into collection buckets while the next student began. Collection buckets were weighed after five minutes with victory awarded to the team with the most soil. Instructors led discussion on participant observations, less soil on tarps and cleaner catch basin water from cover crop samples. Discussion following the obstacle course had active engagement, and participants demonstrated improved knowledge on the role of cover crops in reducing soil erosion.

P68. A Shift in Strategy: Using Environmental-Based Models to Improve Fungicide Timing for Apple and Soybean Protection

José González-Acuña; Poster, Doctorate

Fungicide applications are a common integrated pest management (IPM) tool, yet their use often follows a set schedule or crop stage rather than actual need. Overuse can drive fungicide resistance, undermining long-term effectiveness. The occurrence of plant disease requires a susceptible host, a pathogen, and favorable environmental conditions. Thus,

fungicides should be applied only when conditions are favorable for disease development. To promote this approach, two experiments were conducted: one on apple (2021-2022) and one on soybean (2023-2024). In apple, three relative humidity-based organic fungicide spray thresholds were tested in central Iowa on three apple cultivars, with the most conservative threshold reducing fungicide applications by four per season without affecting marketable yield. Disease pressure remained low with an average incidence of Sooty Blotch and Flyspeck (SBFS) of 3.9% in 2021 and 1.9% in 2022. For soybean, a weather-based model for frogeye leaf spot was developed and tested in eight states across 10 sites in 2023, leading to a reduced number of fungicide applications. In three sites, a fungicide application at the R3 stage, reduced disease (AUDPC) but no effect on yield was observed in any site. In 2024, a new model was developed and validated in 10 states and 20 sites and data analysis is ongoing. Deciding if or when to apply a fungicide is an essential part of an IPM program, and continued efforts to refine predictive tools can offer agronomic, economic, and environmental benefits across cropping systems.

P69. Role of mango fruit volatiles in attraction and oviposition behaviors of female adults and fitness measures of offsprings' of *Bactrocera zonata* (Saunders)

Hassan Ali; Poster, Masters

The present study aimed to explore the impact of volatile compounds from mango fruit on attraction, oviposition and other important fitness parameters of the peach fruit fly, *Bactrocera zonata* Saunders (Diptera: Tephritidae), which is a destructive to mango, guava and peach as well as many other fruits in Pakistan. Attraction behavior of *B. zonata* female flies toward the fruit volatiles of five local mango varieties; Sufaid Chaunsa, Black Chaunsa, Fajri Kalan, Aman Dusehri, and Anwar Ratol and two synthetic commercial baiting products (GF-120 and Bio-guard) was observed in a Y-tube olfactometer. Female fruit flies were significantly (greater than 0.05) attracted to un-infested, fruit fly infested, and synthetic attractants compared to control (blank) in all pair-wise combinations tested. In the pair-wise comparisons between un-infested mango varieties, significantly more female flies were attracted towards the volatiles of F. Kalan compared to B. Chaunsa and A. Dusehri. In the case of fruit fly infested fruits of different mango varieties, female fruit flies preferred F. Kalan compared to A. Ratol, while S. Chaunsa compared to B. Chaunsa and A. Dusehri. In intra-varietal comparisons, significantly more female flies were attracted towards un-infested fruit odors than the odors of fruits of the same varieties infested by flies in all five tested varieties. When comparing un-infested mango varieties with synthetic attractants, female fruit flies preferred A. Dusehri over GF-120 and Bio-guard. S. Chaunsa and A. Ratol fruit odors attracted more flies compared to the synthetic attractant GF-120. However, significantly more flies were attracted towards the odors of the

other synthetic attractant, Bio-guard, compared to F. Kalan and B. Chaunsa varieties. In the two-choice oviposition bioassay using only the un-infested fruits of different mango varieties, B. zonata female flies made significantly more visits (landing on fruit) on F. Kalan compared to S. Chaunsa and A. Ratol. Similarly, the number of visits by female flies recorded on A. Dusehri and S. Chaunsa were more compared to A. Ratol and B. Chaunsa, respectively. *B. zonata* females made significantly more successful ovipositions on A. Dusehri and S. Chaunsa compared to A. Ratol and B. Chaunsa, respectively. Female flies spent significantly longer time on A. Dusehri variety compared to A. Ratol during two-choice oviposition bioassay. In coordination with attraction and oviposition bioassay, a significant difference was observed in number of pupae obtained from S. Chaunsa variety and A. Dusehri as more pupae were collected from S. Chaunsa compared to A. Dusehri. Pupae collected from S. Chaunsa and A. Ratol varieties were heavy compared to A. Dusehri. Similarly, more adults emerged from S. Chaunsa and A. Ratol compared to adults emerged from A. Dusehri and B. Chaunsa. In no-choice oviposition bioassays, no significant difference was observed in the number of visits, successful oviposition, time spent for oviposition, number of pupae obtained, average pupal weight and adult emergence rate in the tested varieties. The results suggest that mango fruit odors have a dominant role in the attraction of *B. zonata* female flies. Female flies favor egg-laying sites that maximize the fitness of their next generations.

P70. Enhancing the efficacy and efficiency of pesticide application technologies through synergy of field, laboratory, and human research for western bean cutworm management

Andrea Rilaković; **Poster, Doctorate**

Improving the efficacy and efficiency of insecticide applications is an integral part of Integrated Pest Management. Western bean cutworm (WBC), *Striacosta albicosta*, is an insect pest that can cause severe damage to corn ears by larval feeding. Inadequate insecticide application may lead to control failures. We have approached this challenge through synergy of field, laboratory, and human dimensions studies.

In a chemigation field study, the efficacy of two insecticides to reduce WBC ear-feeding injury and the deposition efficiency (using PTSA florescent dye) was tested. The low end of the labeled rates of bifenthrin was the least effective in reducing WBC ear-feeding injury and yield loss. The low and high ends of the labeled rates for chlorantraniliprole were highly effective.

Laboratory studies have used spray chamber parameters to reproduce the application deposition patterns documented in the field. These simulations have compared the efficacy of aerial applications with chemigation, resulting in higher mortality under simulated aerial applications.

A survey of maize producers, crop consultants, and professional pesticide applicators in Nebraska (n=123) indicated that 84% chose aerial application and 46% chose chemigation to control WBC. The most important factors affecting the choice of aerial application are timeliness (80%) and effectiveness (47%); for chemigation, timeliness (77%) and equipment availability (69%).

The combination of field, laboratory, and human research has allowed for synergy in improving insecticide applications, which leads to improved stewardship of insecticide active ingredients, resistance management, reduction in off-target movement of insecticides and impacts on non-target organisms and improves economic viability for producers.

P71. Rooting for sustainability: plant growth-promoting rhizobacteria as a biological tool in turfgrass

Kayla Sullins, Poster, Doctorate

In the agricultural industry, chemical fertilizers and pesticides are often utilized for promoting plant growth and suppression of pathogens. While these applications are notably beneficial to plants, the ramifications of overused/misused chemicals have led to extensive ecosystem losses and environmental damages. Sustainable agriculture seeks to maintain productivity while efficiently using resources (pesticides and synthetic fertilizers) and integrating biological components. Recent studies suggest that utilizing plant-growth promoting rhizobacteria (PGPR) as a biological alternative can reduce the quantity of chemicals required to maximize yield and protect plants. The objective of this study was to create specialized PGPR products that increase plant health in zoysiagrass (*Zoysia japonica*) by means of enhanced nutrient uptake and pathogen suppression of *Rhizoctonia solani*. In this 2-year study, 110 PGPR strains from a collection at Auburn University were analyzed in vitro for mechanisms of nutrient acquisition and antagonistic behavior against *R. solani*. These preliminary in vitro trials were utilized to focus strain selection to those exhibiting outstanding antagonistic behavior (22 strains) and greatest potential for enhancing plant nutrient uptake (60 strains). Follow up greenhouse experiments were conducted in which these strains were analyzed for effective growth promotion of zoysiagrass. From this data, 3 specialized PGPR blends were created and applied in field conditions in Spring 2024. Treatments will be compared to industry standard fungicides. Results from these studies will be presented.

P72. Intercropping flowering plants with watermelons as a habitat for pollinators for sustainable crop production

TreDarious Clifton; Infographic, Masters

Watermelons (*Citrullus lanatus*) are an important fresh market crop worldwide.

In 2023 the US watermelon market was valued at approximately $748 million. Pollinators are essential for our environment and crop production systems. Over 70 percent of the world's flowering plants, including two thirds of the world's crops species such as watermelons, depend on pollinators to reproduce. Loss of habitats for pollinators is a threat to the sustainability of farming and global food security. Pollinator health is a national research priority. More research is needed on managing habitats such as flowering plants to support pollinator populations by providing nectar and pollen resources. The objective of our research is to evaluate a diversity of flowering plants intercropped with watermelons to attract a variety of pollinators including honeybees and native bees to enhance pollination and fruit development and quality of watermelons. On June 12, 2024, we intercropped three flowering plants species Zinnia (*Zinnia elegans*), Sunflowers (*Helianthus annuus*) and Okra (*Abelmoschus esculentus*) with four watermelon cultivars (*C. lanatus*) sugar baby, Charleston gray, Jubilee, and tender sweet on the Alcorn State University Model Farm in Lorman, MS and at a watermelon variety trial on the Alcorn State University Agricultural Experiment Station. Bee traps were set up at both locations and monitored every 48 hours over four weeks to quantify the number and diversity of bee species visiting the watermelons plots. Preliminary results have shown a wide variety of bees, mostly bumble bees (*Bombus* spp.), visited the plots. Good watermelon pollination and fruit set was documented.

P73. Factors affecting the success of biofertilizers in Bermudagrass pastures

Jose A Noveron-Nunez; Poster, Doctorate

Regenerative agriculture focuses on reduced chemical inputs, improving soil health while maintaining high productivity. Forage production with frequent defoliation and regrowth, is heavily reliant on chemical fertilizers. Plant growth promoting rhizobacteria (PGPR) show promise to reduce chemical inputs and maintain comparable growth with reduced fertilizer inputs, but there are concerns about consistent performance of biological products. We investigated how common soil, stand, and weather factors on 7 production sites contribute to the responses of *Paenibacillus riograndensis* DH44, a PGPR strain with documented success in forage grass. In greenhouse experiments, we determined 105 CFU/mL was the lowest concentration of DH44 to achieve growth promotion in bermudagrass. Data from routine soil and phospholipid fatty acid (PLFA) tests were collected on samples from each stand. Principle component analysis was used to visualize 1) key factors that contribute variation based on clustering due to treatment performance and 2) the relationship between soil factors and growth responses (forage height and mass).

P74. Gauging the acceptance of tick management strategies amongst vulnerable populations

Joellen Lampman;

In-person focus groups were conducted in Onondaga County, NY to identify current needs and best practices for effective tick bite and disease prevention among several target audiences in New York State, including those identified by the CDC to be disproportionately impacted by infectious diseases – parents of young children and outdoor workers. The analysis is currently underway using ATLAS.ti to assess the knowledge, attitudes (including acceptance and willingness to pay), and practices of these two populations regarding ticks, tick-borne diseases, and management practices meant to reduce risk.

Objectives:

Determine the acceptance of various environmental tick management and personal protection strategies by target audiences.

Determine the degree to which risk perceptions and confidence constrain the adoption of tick management strategies.

P75. Students research and extension experiential learning in climate smart Integrated Pest Management targeting underserved small farmers

Raven Butler; Infographic, High School Graduate

Small farmers in the southern region of the U.S. face challenges in managing plant diseases, weeds, and insects in crops and forest ecosystems. Yield losses due to sub-tropical climate conditions, weather extremes (e.g., hurricanes, drought, tornados), and pest outbreaks have been substantial. As climate change continues to intensify and create new pest threats, it is critical that we train the next generation of plant health management scientist and professionals in how to respond and develop new farm and forest ecosystems management practices to mitigate the impacts of climate change on crop production. Underserved farmers and communities are especially vulnerable due to limited resources and lack of integrated pest management training in climate smart agriculture. To maintain our nation's global competitiveness in sustainable agriculture we need a diverse, well-trained workforce. The overall objective of this project is to provide students with research and extension experiential learning opportunities in climate smart IPM practices. The small farm IPM interns engaged in firsthand research in the use of cover crops for carbon sequestration and soil health. Students planted and maintained research and extension demonstration field plots to showcase the use of flowering plants for pollinator health and biodiversity in crop production. Additionally, the small farm IPM interns conducted a plant pest survey of plant diseases and insect pests impacting small farms in Mississippi and Louisiana.

P76. Developing non-chemical strategies to manage plant-parasitic nematodes in peanut in North Carolina

Ethan Foote; Poster, Doctorate

Key pests to North Carolina peanut (*Arachis hypogaea* L.) production are rapidly evolving. Whether it is new pest species, population shifts, or the development of pesticide resistance, peanut growers and researchers are continually seeking answers to current problems and solutions for future problems. Cultural practices are used to interrupt the lifecycle of nematodes in relation to the host crop. Alternative approaches to nematode management in peanuts have been explored through multiple long-term research trials to test the influence of multiple cultural practices on plant-parasitic nematode populations, both with and without the use of an in-furrow nematicide. These studies were conducted in the same fields in North Carolina to determine the effects of crop sequence, including corn (*Zea mays* L.), cotton (*Gossypium hirsutum* L.), and soybean [*Glycine max* (L.) Merr.], as well as the influence of conventional tillage versus strip tillage and peanut cultivar selection. In general, increasing the number of years between peanut plantings or including soybean, rather than corn or cotton, resulted in lower peanut yields and higher nematode populations. Tillage method was generally not significant for nematode populations and the interactions with crop sequence varied. Planting known nematode resistant peanut cultivars resulted in lower plant-parasitic nematode populations in the soil. These results indicate that cultural practices (i.e. crop sequence and cultivar selection) have a greater influence on plant-parasitic nematode populations than an in-furrow nematicide in North Carolina peanut production.

P77. Integrated Pest Management of Spotted Wing Drosophila (Drosophila suzukii): Management Strategies to Control a Devastating Insect Pest

Abbey Stewart; Infographic, Bachelors

Spotted Wing Drosophila, *Drosophila suzukii*, is an invasive fruit fly native to Southeast Asia that devastates berry crops and fruit orchards. Over time, researchers designed thorough integrated management strategies to control this invasive pest. This infographic visually summarizes a micro-literature review written by the presenting author that reviews research published from 2019 to 2024 on management strategies to reduce *D. suzukii* in agricultural settings. It defines four major integrated pest management categories (chemical, biological, mechanical, and cultural control) and discusses the efficacy of each strategy to control *D. suzukii*. The infographic compiles research findings to offer further directions for *D. suzukii* management research. This information is important to understand as *D. suzukii* continues to develop insecticide resistance and adapt to

integrated pest management strategies implemented in fruit orchards across the United States.

P78. Survey of knowledge, attitudes, and hazard controls for rodent-borne disease in New Orleans sanitation workers

Rachel Denny; Poster, Doctorate

Transmission of *Leptospira* bacteria, the causative agent of Leptospirosis (Weil's Disease), to humans most often occurs through exposure to the urine of infected animals, particularly urban rats (*Rattus* spp.). While Leptospirosis is known to be an occupational hazard for a variety of professions, a 2023 study found that sanitation workers are four times more likely to be exposed to Leptospira when compared to workers in other urban occupations. 21% of the confirmed cases of Leptospirosis in New York City's 2023-2024 outbreak were sanitation workers, indicating that there is a need for risk assessment and implementation of hazard controls for this occupational group in major metropolitan areas of the United States. To perform a preliminary assessment of risk of exposure to Leptospirosis and other rodent-borne pathogens for sanitation workers employed by the City of New Orleans [CNO] Sanitation department, informal interviews were conducted with field-employees and management. The knowledge, practices, and resource availability in the CNO Sanitation department were evaluated, summarized, and used to inform suggested measures to reduce the risk of worker exposure to Leptospira and other rodent-borne pathogens. Suggested measures, such as the requirement that full-length pants be worn for field activities, were formulated to follow the NIEHS hierarchy of controls. Future work aims to survey the prevalence of rodent-borne pathogens in the New Orleans environment to further assess the risk of exposure and infection for sanitation workers as well as other potentially vulnerable populations within the city.

P79. Integrated pest management of chilli thrips in Alabama nurseries

Aerianna Littler; Poster, Doctorate

Chilli thrips (*Scirtothrips dorsalis* Hood) are economically important pests of ornamental, fruit, and vegetable production. In ornamental crop systems, this species causes significant damage resulting in drastic reduction in plant marketability. While chilli thrips are found worldwide, establishment in Florida and Alabama have only recently been documented (1991 and 2017 respectively). Furthermore, resistance to insecticides has been observed within their native range and recently in Florida. Due to this rapid range expansion and reported resistance, investigating seasonal phenology and alternative management strategies has become a necessity. This study aims to investigate biological control strategies, potential volatile attractants, insecticide

resistance, and seasonal flight patterns/abundance of chilli thrips within Alabama. In a two-year study conducted in Mobile, Alabama, sticky cards were collected from plant nurseries to determine abundance and seasonal distribution. We observed that chilli thrips were most abundant in 3-month periods during the spring and fall, with peaks being observed in April and October. Spring 2024 results may even indicate grower surveys and treatment within their nurseries, though we are surveying growers for confirmation. A biocontrol assay was performed to determine the efficacy of two predatory species (minute pirate bugs and *Amblyseius swirskii* mites; individually and together) in controlling chilli thrips populations in a nursery setting. This assay includes host plants of *Distylium*, *Cleyera*, rose, and azalea with heavy chilli thrips populations and damage in Auburn and Mobile. These results may indicate sustained control over a five-week period. This assay is being repeated in Fall 2024 to confirm these results.

P80. Using ecology to inform IPM development for alfalfa mosaic virus in chili peppers nurseries

Lara Amiri-Kazaz; Poster Doctorate

The recent discovery of alfalfa mosaic virus (AMV) in Colorado chili peppers has caused major yield losses for growers, requiring integrated pest management (IPM) solutions to mitigate virus prevalence in their fields and produce better quality yields. To address this issue, we first tested for host plant resistance in the greenhouse by mechanically inoculating 20 different chili pepper varieties with AMV and collected symptom severity (number of leaves with symptoms/total number of leaves) and virus incidence (using ELISAs) for each plant. We then tested promising varieties in the field and found that several varieties showed strong tolerance (low symptom severity and incidence) against AMV in field conditions. We also investigated the ecological concept of associational susceptibility, a plant-plant association where one plant negatively affects a focal plant by increasing detection and/or vulnerability of that species to herbivores. Alfalfa is a reservoir for both AMV, and several aphid species known to transmit the virus, and is often grown in the vicinity of chili peppers in Colorado. Chile pepper farms in Colorado and California within 1-20 miles of alfalfa were sampled from May to August. Symptom severity (percent estimate of symptomatic leaves per plant) and virus incidence was assessed. Preliminary results from this study indicate that closer proximity to alfalfa increases both the incidence and severity of AMV symptoms in chili peppers. Testing for host plant resistance and assessing the risk that alfalfa poses to chili peppers will help inform management recommendations that reduce the risk of infection.

P81. Phenology models and host plant resistance to inform pest management for a new stem-boring agromyzid in quinoa

Neha Panwar; Poster, Doctorate

Quinoa (*Chenopodium quinoa* Willd.), a crop cultivated in South America for over 5000 years, is gaining popularity in new regions like Colorado due to its high nutritional value and low water requirements. However, its expansion has been severely impacted by outbreaks of a stem-boring fly, *Amauromyza karli* Hendel (Diptera: Agromyzidae). The larvae feed inside quinoa stems, destroying the pith and often causing plant death. These outbreaks have reduced quinoa acreage in Colorado from 3000 acres in 2022 to just 100 acres by 2024. Integrated Pest Management (IPM) strategies, including predictive modeling and host plant resistance, are urgently needed to mitigate the economic and ecological challenges posed by this pest. This study developed models to predict the phenology of *A. karli* using both ordinal day and degree day approaches, based on three years (2022–2024) of field data. The ordinal day model provides a straightforward calendar-based framework, while the degree day model captures temperature-driven developmental patterns, utilizing cumulative heat units above a base temperature of 10°C. These models identify critical periods of pest activity, enabling growers to time management tactics, including pesticide applications, cultural controls, and planting date adjustments. Furthermore, our host plant resistance trials identified significant differences in susceptibility among varieties, with some showing promise as resistant options. Resistant varieties planted during low-risk windows identified by the phenology models can significantly reduce pest damage. Together, these approaches enhance IPM frameworks for sustainable pest control in quinoa cultivation, offering a pathway to restore quinoa production in Colorado and beyond.

P82. Non-rodenticide rat management in national parks

Elizabeth Rush; Infographic, Masters

The National Park Service (NPS) recently implemented a policy prohibiting rodenticide use on NPS properties, except under two specific conditions: island ecosystems or collaborations with other government agencies. In response, the National Mall and Memorial Parks (NAMA) became the first national park to adopt carbon dioxide and carbon monoxide treatments to manage rat populations, significantly reducing rodenticide use in 2023. Both carbon dioxide and carbon monoxide act as asphyxiants, euthanizing rats within their burrows. NPS staff identified advantages and limitations of these gas-based treatment systems. The differing weights of the gases make them particularly suited for treating burrows in various urban substrates. Burrows in urban environments often form under challenging locations, such as beneath trash can pads or sidewalks, complicating treatment efforts. Despite these challenges, gas treatments have proven effective in managing rodent populations in these hard-to-reach areas.

P83. Effect of herbicide and cover crop on critical weed removal timing in corn and cotton

Brock Dean; Poster, Doctorate

Integrated weed management, including herbicides and cover crops, is highly advised for controlling multiple herbicide-resistant weed biotypes. While cover crops have shown potential in suppressing weed emergence, few studies have evaluated whether combining herbicides and cover crops can alter the critical timing of weed removal in corn (*Zea mays* L.) and cotton (*Gossypium hirsutum* L.). In 2024, a field study was conducted near Lewiston and Rocky Mount, NC, to address this issue. The study design was a 2x3x2x4 strip-split plot, with main plots consisting of two crops (corn or cotton). Within each crop, three cover crops were stripped: cereal rye, wheat, no-cover. Randomized within each cover crop was residual herbicide (acetochlor at 1,260 g ai ha-1; Warrant®) versus no-residual, as well as four postemergence weed removal timings (None, 2, 4, and 6 weeks after planting (WAP)). At each removal timing, glyphosate (Roundup PowerMAX® 3) and glufosinate (Liberty® 280 SL) were applied at 1,345 g ae ha-1 and 656 g ai ha-1, respectively. Pooled over all other factors, applying acetochlor improved Palmer amaranth (*Amaranthus palmeri* S. Watson) control to 88%, compared to 72% without acetochlor. No differences in Palmer amaranth control were observed when plants were managed 2 (95%) and 4 WAP (95%); however, control was reduced to 87% when management was delayed until 6 WAP. Cereal rye and wheat provided 83% control of Palmer amaranth, whereas no-cover resulted in 75% control. Yield data has not yet been analyzed to determine if herbicide and cover crop combinations affect crop yield.

P84. Opportunities for Innovations, technology development in mulberry value-added food products and pest management

Ashwini Jadhav; Poster, Masters

There are ample opportunities in innovations and technology development in silk and sericulture resources. Mulberry is sole food of silkworm *B. mori* hence it is cultivated extensively by the farmers. Mulberry is having high potential for value addition and for development of chain of products. Why Mulberry is a question but it is easy to grow, high biomass production in shortest time, easy to produce biomaterials, large area under cultivation in India. During the years 2022-23 about 253125 hectors mulberry area was under cultivation. Hence, a raw material is available on large scale as conducive environmental conditions are persisting in India to grow mulberry extensively. It is well established fact that, Mulberry has high GABA & 1 DNJ content, it has properties like Anti-diabetic, Anti-hypertension, Anti-cholesterol, Anti-ageing, High proteins, High minerals and Vitamins and no caffeine. Hence, mulberry can be used in various

innovations to develop products useful in animal and human welfare and health benefits too. We have successfully demonstrated sustainable technologies for commercial products out of mulberry. However, there are many constraints to produce quality mulberry leaves for process of value-added products particularly infestation of various pests. Therefore, attention was given on foliar pests. Survey was carried out for two years (2022-2023) with local farmers to know status of promising mulberry leaf pests. It was noticed that about 20 to 30 leaf production and quality was affected due to various foliar pests. To get quality foliage and develop international quality mulberry value-added products IPM practice are highly required. There are equal beginnings for food technologists, entomologists, physicists, chemical and biotechnologists to have interdisciplinary research work in this area. Details are discussed in the paper.

P85. Insect pests of sweet potato in Florida and Brazil and their biological control

Maria Cabral, Poster, Doctorate

Sweet potatoes are extensively grown in many parts of the world. The tubers are a highly nutritional food source with a growing market and are recognized for their contribution to food security. The health of sweet potato plants is affected by various insects that can cause damage to cultivated crop in the open field and storage. This study reports pest species on sweet potatoes in Florida and compare them with pests that attack this crop. Species of pests attacking, types of attacks on aerial and root parts, levels of damage, and distribution within and among fields will be observed, along with natural enemies. Pests were identified in sweet potatoes, one for the roots and 10 for the aerial part. One is sap-sucking, three insects within the Order Coleoptera and Family Chrysomelidae, five defoliating caterpillars, and a leaf-mining micro-Lepidoptera. A major pest of sweet potatoes is sweetpotato weevil (SPW) (Coleoptera: Brentidae) that damages this commercial crop in the field and storage. Other insect pests and their natural enemies are being investigated in the Florida panhandle. Biological control is less costly and cheaper than any other method. Within IPM, one of the most modern approaches is the role of biological control in a system that must initially involve the biological balance of pests with their natural enemies and levels of economic damage. The main advantages of these types of biological control are that they reduce negative impacts on human health, have minimal impact on the environment and reduce pest resistance

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