

Annual Meeting March 15th, 2023 Virtual Meeting

Northeast Region Technical Committee on Integrated Pest Management (NEERA 2104)

The purpose of this annual meeting is to discuss important issues, share experiences and plans, devise regional responses to national issues, and coordinate collaborative multi-state activities. Each state provides a two-page summary of IPM activities in their states (state reports follow this summary of general topics of discussion).

Attendees:

- Chair & NH Representation: Anna Wallingford (Anna.Wallingford@unh.edu)
 - Amber Vinchesi-Vahl will take over “past-chair” responsibilities (Amber.Vinchesi@unh.edu)
- Administrative Advisor: Margaret Smith; mes25@cornell.edu
- NIFA Liaison to NEERA 2104: Rubella Goswami (rubella.goswami@usda.gov)
 - NIFA’s past liaison Mat Ngouajio (mathieu.ngouajio@usda.gov)
- NIFA NPL for Competitive Programs: Vijay Nandula (vijay.nandula@usda.gov)
- Northeast IPM Center: Deb Grantham (dgg3@cornell.edu), David Lane (del97@cornell.edu), Mike Webb (mrw11@cornell.edu), Jerrie Haines (jlh472@cornell.edu), Kevin Judd (kaj57@cornell.edu)
- Massachusetts: Hilary Sandler (hsandler@umass.edu), Susan Scheufele (sscheufele@umext.umass.edu)
- Vermont: Sarah Kingsley-Richards (Sarah.Kingsley@uvm.edu), standing in for Ann Hazelrigg (Ann.Hazelrigg@uvm.edu)
- Connecticut: Nick Goltz (nick.goltz@uconn.edu)
- Rhode Island: Lisa Tewksbury (lisat@uri.edu)
- New York: Alejandro Calixto (aac273@cornell.edu)
- Pennsylvania: John Tooker (tookert@psu.edu)
- Delaware: David Owens (owensd@udel.edu)
- Maryland: Kelly Hamby (kahamby@umd.edu), Simon Zebelo (sazebelo@umes.edu)
- West Virginia: Mafuz Rahman (mm.rahman@mail.wvu.edu), Rakesh Chandran (RSChandran@mail.wvu.edu)

Topics of General Interest

- *NIFA is now Fully Staffed!*

We should be expecting to see some new faces representing NIFA as Vijay and Mat pull back from involvement in certain programs to focus on their main responsibilities. They shared several links to programs pertinent to IPM specialists including CPPM, several AFRI programs (including the CARE program), Methyl Bromide Alternatives, IR-4, OREI & Organic Transitions, SCRI, Disaster Response, etc.

Signing up for NIFA Updates:

https://public.govdelivery.com/accounts/USDANIFA/subscriber/new?qsp=USDANIFA_2

To volunteer as a NIFA panelist <https://prs.nifa.usda.gov/prs/volunteerPrep.do>

- *EIP Funding is Critical to Maintaining IPM Programs in the State*

Most attendees agreed that they would likely not have an IPM program in their state if not for EIP funding for salary support, etc.

We also discussed creating a repository of EIP proposals (e.g. limited access One Drive folder), for the purpose of regional alignment but particularly for new IPM coordinators preparing their first proposal.

- *Presenting IPM to the Public*

Many growers in our region would like support in communicating about IPM in retail markets. A template for developing market-specific brochures might be beneficial.

Brochures developed by the IPM team in Vermont for backyard gardeners:

<https://www.uvm.edu/sites/default/files/Extension-Community-Horticulture/Resources/IPMOverview2023.pdf>

Brochures from WVU on Tree Fruit IPM: find following state reports

<https://entomologytoday.org/2023/03/07/survey-details-integrated-pest-management-adoption-challenges-united-states/>

- *Impact Reporting*

The IPM team in Massachusetts is currently making a big effort to conduct pre-season and end-of-year interviews with their clients to get a deeper understanding for the impacts of their work. They are also developing training materials with David Lane and we hope to see some online training materials to be available more broadly in the future. This skill set is particularly important for our work and becoming an increasingly sought after skill among next gen extension specialists & researchers.

<https://www.northeastipm.org/index.cfm/ipm-planning/evaluation/ipm-evaluation-training-courses/>

<https://www.northeastipm.org/ipm-planning/evaluation/>

<https://www.northeastipm.org/about-us/publications/impact-statements/impact-statements/>

- *Website Revamps & Americans with Disabilities Act Compliance*

Many state representatives reported that their institution was working on a website redesign, which included considerations on how their clients access information online as well as how to ensure ADA compliance on web materials. Many reported challenges with their institutional framework, including limited accessing their platforms to make updates. Some examples of new IPM websites:

<https://ag.umass.edu/integrated-pest-management/about>

<https://extension.unh.edu/agriculture-gardens/pest-disease-growing-tools/integrated-pest-management-ipm>

<https://ipm.cahnrc.uconn.edu/>

<https://newa.cornell.edu/>

- *Invasive Species*

The team from Connecticut is producing lots of resources, including the 11th annual Connecticut Invasive Plant Working Group.

Black swallowwort & lily leaf beetle projects in CT & RI.

Spotted Lanternfly: Pennsylvania has lots of great resources. NEWA is launching a new model, which is currently being validated.

- *Public Health*

NY team working on more programs for rodent management in Ag and Urban environments (Matt Frye, Dan Wilxted).

Dion Lerman training next generation of urban & school IPM specialists in North Philadelphia, working with Medicare & local medical institutions (e.g. Liberty Resources) to support IPM services for homebound residents.

Bedbugs – Apprehend is a biological control that is a major component of IPM in Philadelphia, check out this YouTube video: <https://youtu.be/2JAOTJxYqh8>

Contract from HUD/NIFA renewed for <http://www.stoppests.org/>

- *Mushroom IPM*

Phorid fly research at PennState, positive phototaxis brings flies to treated screens on windows of houses.

- *Accessing Existing Extension Resources*

Many states/institutions in our region lack full coverage of expertise in several disciplines (e.g. weed science, IPM in animal science, etc.) and often benefit from resources that are developed by specialists in other states in the region. Where can they go to find an up-to-date factsheet that's appropriate for our region (other than be an active participant in NEERA 2104)?

What happened to eXtension as a searchable database? Not maintained?

Some states are part of Extension Foundation, which has an "Online Campus," but membership is expensive. Master gardeners use AskExtension in many states.

NEIPMC already does a lot of this, including an IPM resources database. We have a NEERA listserv that could serve us here. NEERA 2104 chairs will work with NEIPMC staff to reacquaint ourselves with all of these efforts. For example:

<https://www.northeastipm.org/partners-in-ipm/regional-partners/neera/>

<https://www.northeastipm.org/about-us/publications/>

- *DEI Training*

"IPM Toolbox" Webinar Series can be found on their YouTube channel and here:

<https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/>

- *Translating Existing Resources*

Many teams mentioned that they were producing outputs in Spanish, French, etc. Reach out to NEIPMC if you have a resource you'd like translated and they can help you find someone in the region who'd like to help.

- *NESARE Support for IPM Education*

Many members rely on NESARE's Research & Education or Professional Development grants to support their work. Their website is also an excellent resource of regionally-appropriate crop production and IPM practices. More information: <https://northeast.sare.org/resources/>

- *Accessing Data from Variety & Pesticide Efficacy Trials*

Many of us conduct field trials, and the results of these trials are typically shared at grower talks, on institutional websites (as research reports), or in discipline-specific publications (e.g. Arthropod Management Tests). This information often makes its way into crop management guides (e.g. New York, New England, Mid-Atlantic guides), but essentially by word-of-mouth and

there is some lost potential here. We could benefit from more cross-regional communication or some centralized database. An example of helpful research reports:

<https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/pest-management/insect-management-reports/>

- *Regional Influence of Avian Influenza*

The IPM team from Delaware reported that there may have been shortages/disruptions in movement of chicken manure because of avian influenza. Unclear if this outbreak had any impact on IPM practices in animal agriculture.

Resources on avian influenza: <https://extension.umd.edu/programs/agriculture-food-systems/program-areas/animal-science/poultry/hpai-highly-pathogenic-avian-influenza>

- *Local Pesticide Laws*

New York State has banned neonic-treated seed (effective 2025). Neonics are now restricted materials in NJ, but this should not impact agricultural applications. Maine now requests more information from registrants regarding PFAS in pesticide containers/formulations, and some companies have stopped registering certain products in Maine.

- *Seed Corn Maggot*

While this topic was brought up because of a neonic ban (neonic-treated seed is now banned in NY, which will likely become a wider trend), many areas in the region are reporting more severe outbreaks in field & vegetable crops both earlier and later in the season that imply something else is influencing pest severity in affected crops. Lots of work coming out of Delaware and Cornell's Seedcorn Maggot Working Group – NEWA launching a new model, which is currently being validated.

- *Tar Spot of Corn*

New & emerging problem affecting yield in field corn, currently in PA, NY, MD, with some concerns for a spreading problem.

<https://extension.psu.edu/tar-spot-a-new-corn-disease-for-pennsylvania>

- *Regional Monitoring Platforms*

New York is expanding NEWA. NPDPN has a robust database for the plant diagnostic network. Cucurbit downy mildew tracking system is still alive and well (and widely used). Southern IPM Center (Joe LaForest et al.) are doing a bang up job of revamping old databases on EddMaps. For example, PestWatch corn earworm database has been migrated to <https://agpestmonitor.org/> Expect more training opportunities from Joe LaForest on rehabilitating, developing, using databases, but their group is great to work with so well worth reaching out.

- *EPA Label Changes for Drift Mitigation*

We've been seeing lots of discussion about new language on pesticide labels over concerns for non-target effects. Most of these are the inclusion of common-sense practices for drift mitigation, but there have been many requests from industry registrants for EPA to provide more specific language about when and how these practices must be implemented by users.

While we don't see as much aerial applications in our region compared to others, we may need to pay more attention to this if drone applications become more accessible to small, medium scale farms. The Massachusetts team is providing training on flying UAVs.

- *Revision of the duties of NEERA 2104 Chair*

Leadership of this group rotates between states. In the next year New Hampshire, Rhode Island, and West Virginia will play the role of past-chair, chair, and chair-elect, respectively. The chair's responsibilities include hosting annual meetings and compiling annual reports for submission to NIMSS. Those who serve as chairs on the regional coordinating committee also serve on the National IPM Coordinating Committee and are often asked to serve on the NEIPM Center's Advisory Panel.

It is highly recommended that chairs form a committee to prepare the next multistate coordinating committee for 2025.

Meet the Team

Rakesh Chandran, Ph.D.

Extension Specialist – Weed Science, IPM Coordinator
(304) 293-2603 • rschandran@mail.wvu.edu

Mira Danilovich, Ph.D.

Extension Specialist – Consumer Horticulture,
Master Gardener Program Coordinator
(304) 293-2620 • mira.danilovich@mail.wvu.edu

Whitney Dudding, B.S.

Plant Diagnostic and IPM Associate
(304) 293-2572 • wldudding@mail.wvu.edu

Daniel Frank, Ph.D.

Extension Specialist – Entomology
(304) 293-8835 • dlfrank@mail.wvu.edu

Barbara Liedl, Ph.D.

Research Scientist – Greenhouse and High Tunnel IPM
West Virginia State University
(304) 204-4037 • liedlbe@wvstateu.edu

Sheldon Owen, Ph.D.

Extension Specialist – Wildlife Management
(304) 293-2990 • sheldon.owen@mail.wvu.edu

Mahfuz Rahman, Ph.D.

Extension Specialist – Plant Pathology,
Director of Plant Diagnostic Clinic
(304) 293-8838 • mm.rahman@mail.wvu.edu

For more information, visit extension.wvu.edu

WVU is an EEO/Affirmative Action Employer. Underrepresented class members are encouraged to apply. This includes: minorities, females, individuals with disabilities and veterans.

In accordance with Federal law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, disability, and reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs).

The WVU Board of Governors is the governing body of WVU. The Higher Education Policy Commission in West Virginia is responsible for developing, establishing and overseeing the implementation of public four-year colleges and universities.

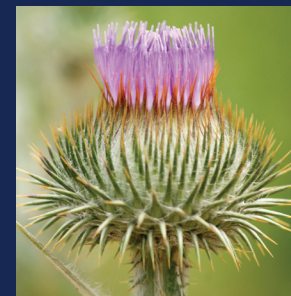
Reasonable accommodations will be made to provide this content in alternate formats upon request. Contact the WVU Extension Service Office of Communications at 304-293-4222.

EXTENSIONSERVICE
AGRICULTURE AND NATURAL RESOURCES

EXTENSIONSERVICE

AGRICULTURE AND NATURAL RESOURCES

INTEGRATED PEST MANAGEMENT



A SUSTAINABLE APPROACH

What is IPM?

- IPM is a sustainable approach to manage pests by employing multiple methods to control them rather than relying solely on pesticides
- IPM uses information about pest biology, habitat and environmental aspects to help make decisions
- The goal of IPM is to maintain pest populations below levels that cause economic damage (i.e., economic threshold levels)

What does IPM entail?

- Proper identification and a sound understanding of pest biology
- Field scouting and monitoring to determine pest populations
- Execution of appropriate controls based on economic thresholds
- Proper record keeping for future reference

Why IPM?

While IPM encourages sustainable pest management strategies and promotes habitat for beneficial organisms in your backyard or farm, it can also reduce:

- Pesticide use and exposure
- Expenditure on chemical inputs
- Injury to non-target organisms
- Development of pesticide resistance
- Ground and surface water contamination



NEERA Report
March 31, 2023
Prepared by Nick Goltz, DPM

The 2022 IPM Program Team included Mary Concklin (fruit), Shuresh Ghimire (vegetables and hemp), Nick Goltz (plant pathology/diagnostics) Ana Legrand (vegetable entomology), Rosa Raudales and Leanne Pundt (greenhouse), and Victoria Wallace (school, invasive, pesticide safety, pollinators, turf and landscape)

For more detailed information, please review our 2022 Annual IPM Report. It can be accessed on the UConn IPM website: <https://ipm.cahnر.uconn.edu/>

Selected 2022 Outcomes:

- Fruit integrated pest management education was delivered to over 571 fruit growers and related industry members throughout 2022 via 62 fruit e-newsletters and pest alert emails.
- Vegetable integrated pest management education was delivered to over 500 vegetable growers and stakeholders every week from May to September 2022 through 19 weekly vegetable pest alert emails focusing on pests, pest management and decision making, and safe pesticide use. The email open rate was 25-30%.
- Sixty-three students enrolled in our online Vegetable Production Certificate course in the winter of 2022. The course had seven modules, each module with a self-paced video, supplemental materials, and a short quiz. The participants learned answers to the basic questions about farm business planning, planning and preparing for vegetable farm, warm and cool-season vegetable production techniques, season extension, identification of biotic and abiotic issues, and marketing. In the post-course evaluation survey (N = 63, n = 20), respondents indicated their knowledge on the subjects increased from average of 43% before the course to 86% after the course.
- The Greenhouse Biological Control conference had 63 attendees. 92% of attendees stated that they learned something to cause them to adopt a new practice within the next year.
- Carla Caballero supported the translation of IPM materials to Spanish. "Educational Needs of the Spanish speaking Workforce in the Green Industry in CT" in English and Spanish (IRB # X22-0142) surveys were developed and completed. Respondents indicated that identification and monitoring of Insect and mite pests (55%), Irrigation (50%) and

identification and monitoring of root diseases (45%), as the top three subjects where they would like more training. Seventy three percent of the respondents indicated that having the information only in English as a factor limiting the participation of the Spanish-speaking workforce to extension trainings programs.

- Over 300 invasive plant activities occurred in over 50 Connecticut towns in 2022. At least 5,017 citizens directly and actively participated in the activities. Many more (at least 7,185) were reached indirectly through articles, YouTube videos, social media, fact sheets, signs, and other educational mediums. A minimum of 15,302 hours were directly invested in invasive plant management, during intensive invasive plant training sessions and management activities, as well as educational outreach. A minimum of 904 hours were provided indirectly as citizens engaged in educational efforts and learned from videos, articles, and fact sheets.
- A small meadow area was established at the UConn Plant Science Research Facility to serve as a demonstration and educational resource that will help address questions about meadow establishment and maintenance. The demonstration meadow is composed of 6 seeded plots, each of which are 6' x 60' – half of the site was planted in spring 2022 and half in fall 2022.
- The eleventh biennial Connecticut Invasive Plant Working Group (CIPWG) symposium was convened via web program on November 3, 2022 with 420 people attending. The symposium theme was Strategies for Managing Invasive Plants: Assess, Remove, Replace, and Restore.
- The UConn Plant Diagnostic Laboratory processed a total of 311 physical samples compared to 208 samples in 2021, an increase of approximately 50%. At an average value of \$50 to \$100 per sample in saved time, labor, and resources, efforts of the lab in 2022 resulted in between \$15,500 to more than \$31,100 in direct savings to New England growers. Additionally, the lab directly responded to at least 350 stakeholder plant health inquires via phone, email, and walk-in. The lab also supported the efforts of the Home & Garden Education Center, which responded to more than 1,649 stakeholder inquiries in 2022. The full Plant Diagnostic Lab report may be accessed at: <https://plant.lab.uconn.edu/diagnostic-reports/>
- There were 65,382 sessions created by 36,422 users of the IPM website (<https://ipm.cahnr.uconn.edu/>) during 2022. Users include residents of Connecticut plus CA, GA, IL, MA, NY, TX, VA, WA, WY and Washington DC, as well as 167 other countries with the top 10 being India, Canada, Philippines, China, Australia, United Kingdom, South Korea, Mexico, South Africa and Kenya.



The Delmarva Lower Eastern Shore IPM Program Report 2022

UMES Extension

UMES Extension program serves farmers in Southern Maryland and all along the Delmarva Peninsula with educational programs and training, technical assistance, and other outreach activities. One of the main focuses of UMES Extension is the Small Farm Program (SFP). The primary mission of the SFP is to deliver educational programs, training, and outreach that helps limited-resource and socially disadvantaged farmers own and operate farms successfully. Though most end-users are in MD, the SFP extends its support throughout Delmarva and is not constrained to small farms. MD is an agriculturally diverse state interfacing an ecologically sensitive and economically vital Chesapeake Bay. The Chesapeake Bay is the second most important economic resource. This situation makes creating eco-friendly IPM programs in MD essential. UMES IPM program provides farmers with information that allows them to farm sustainably.

Funding

The UMES IPM Program is funded by USDA (Evan Allen, NIFA CPPM-EIP, IR4, SARE, 1890 Extension), the State of Maryland Extension Program, and the USAID (IPM Innovation lab, and Emergency Transboundary Outbreak Pest (ETOP))

IPM Team Members

- Behnam Khatabi- Plant Pathologist
- Naveen Kumar Dixit- Horticulture Extension Specialist
- Jennifer Timmons- Poultry Production
- Sadanand Dhekney- Plant breeder
- Simon Zebelo-Entomologist
- Berran Rogers- Extension Specialist
- Nadine Burton-Extension Specialist

Partners/Collaborators

- University of Maryland College Park
 - Cerruti Hooks, Kurt Vollmer, Dwayne Joseph, Kelly Hamby, Anahi Espindola
- The IR-4 Project
 - Marylee Ross and Megan James
- University of Maryland Extension (UME)
 - Jonathan Moyle, Jennifer Rhodes, Alan Leslie

Significance of the UMES IPM program: UMES IPM program clientele consists mainly of conventional growers of large and medium-sized farms. However, agriculture census data indicates that small-scale and organic farms are ascending in MD. Organic, small acreage and underserved farmers such as those along MD Eastern Shore and the Delmarva Peninsula face many challenges such as high input costs, insufficient market outlets, rising farmland costs, finite production skills, lower annual sales, and quality of life. Their ability to remain viable in the face of these challenges has become progressively difficult. Consequently, there is a dire need to develop more educational programs to provide the skills required to thrive under economically trying times. UMES IPM

program is tasked with directing educational programs that improve the economic condition of small-scale, limited-resource and/or socially disadvantaged farmers and allow them to overcome their challenges. Much of this work is done via UMES's Small Farm Program (SFP). UMES IPM Program objectives include maintaining the economic viability of the small farmers, providing farmers information that allows them to farm sustainably by conserving environmental quality and natural resources, educating pesticide users about the safe use and handling of pesticide products, and the effective use of biological control agents. Moreover, the program participates on international programs to mitigate pest problems in the developing world. The program activity is mainly supported by the 1890 extension, Evan **Allen Project**, the **IR-4 Project**, **SARE**, **USDA-CBG** and the **USDA CPPM EIP project**.

Extension Implementation Project (EIP)

- IPM Implementation in Specialty Crops (50%) (cucurbits, sweet corn, eggplant, strawberries, and grapes),
- IPM Implementation in Agronomic Crops (23%) (hemp and soybeans)
- IPM Implementation in Animal Agriculture (17%) focusing on poultry.

Work in progress

- Hiring IPM coordinator

Outcomes

- UMES IPM website launched. <https://wwwcp.umes.edu/sans/aes/cipm/>
- On May 04, 2022, Extension Lunch and Learn Presentation on the fly management in poultry facility and residences, Attendance 36
- Spring-seeded cover crops for weed management in row middles. BARC Pesticide Applicator Recertification Training. (Online course). Attendance 87.
- Herbicides and Integrated Weed Management. Lower Eastern Shore Agronomy Day, Pocomoke City, Maryland. Attendance 122.
- AgDiscovery Horticulture Workshop-III: Use of nanotechnology in plant pathogen management. (06/17/2022). UMES, Princess Ann, MD. (Attendance: 20).
- Efficacy of biosolarization and living mulch for weed control in vegetables. Central Maryland Vegetable Grower's Meeting, Monkton, Maryland. Attendance 82
- Update on noxious weed law and right-of-way management". BARC Pesticide Applicator Recertification Training. Online Course. March 2, 2023. Attendance 87
- In the 19th annual UMES small farm conference, a symposium on reducing cross-contamination between animals and produce was delivered to over 31 vegetable growers.
- As part of the UMES small farm conference, around 32 people visited the on-farm research trial on sweet corn as a trap crop in the hemp field
- We hosted a Farm club meeting last August attended by around 17 farmers and delivered information on the use of trap crops in watermelon production
- Eight video series developed in Integrated Weed Management(IWM) and published UMES IPM website
- Cultivation of Bitter Gourd, training, fertigation, and diseases management. (06/10/2022) Therapeutic Alternatives of Maryland, Baltimore, MD. (Attendance: 8).
- Using a living mulch as part of an IWM program in a sweet corn crop rotation system. University of Maryland Eastern Shore 19th Annual Small Farm Conference. November 04-05. Princess Anne, MD Attendance 20

Maryland IPM State Report

Submitted by Kelly Hamby, MD IPM Coordinator

Situation: Maryland (MD) is a heavily urbanized, densely populated state bordering the Chesapeake Bay. Agriculture is the largest single land use in the state, with 32% of MD's total land area used for farming. The proximity between agriculture, environmentally sensitive areas, and human populations necessitates the implementation of sustainable IPM practices that reduce risks to human health and the environment. We serve a diverse population producing numerous agricultural commodities.

Response: Leveraging connections within the state and beyond, we work to provide timely research-based IPM information that is responsive to stakeholder needs and anticipates emerging issues. We use a breadth of in person and media delivery mechanisms, working to extend our reach and additionally target underserved populations.

Outputs and Impacts:

Green Industries. Our green industry team delivered multiple intensive training events and workshops, including a biological control conference, a cut flower short course, an advanced landscape IPM short course, in addition to shorter presentations. Over 2000 stakeholders were reached with in person content. Documented impacts include improvements in stakeholder's ability to monitor for pests, identify and diagnose plant damage and insect pests, identify natural enemies, and select reduced risk pesticides. A survey of IPM Landscape and Nursery Report readership (n = 515) indicated that 88% of respondents improved their pest and disease diagnostic skills, 58% were more likely to use "alternative" pest management (soaps, oils, biological controls, cultural practices), 77% improved their recognition of beneficial insects, and 66% changed their management practices as a result of recognizing beneficials.

Communities. UMD's Home and Garden Information Center (HGIC) delivered 83% of the top 500 most-viewed University of Maryland Extension web resources and answered 6,010 questions in 2022. Of the 1288 people surveyed, 94% felt more confident about handling their issue as a result of the answer they received, 70% intended to change a practice or behavior, and 47% intended to manage a weed, plant disease, or other pest problem without using pesticides. In addition, Maryland Grows received the 2022 Northeast Region Online Communications category award from the National Association of County Agricultural Agents. The Maryland General Assembly passed HB991 during the 2021 season to support and encourage public and private tree-planting efforts, with a goal of planting and maintenance of 5 million native trees by 2031. 500,000 of these trees must be planted in underserved areas. Our team has been providing valuable expertise to these efforts, including a consolidated native tree list with recommendations to help make informed planting decisions.

Pollinator Protection. Our pollinator team has developed diverse demonstration and educational resources including apiaries for honeybee health monitoring, farm floral supplementation plantings, and pollinator gardens. In addition, educational resources on

pollination including 4 lesson plans for 4H camps and 9 Maryland Grows blog posts have been produced.

Fruit and Vegetables. Demonstration plots were highlighted in the Maryland State Horticultural Society summer tour in 2021. A new listserv was developed for apple growers that delivered 9 posts on apple maturity and quality. Three peer-reviewed fact sheets, 4 newsletter articles, and 11 presentations were also provided.

Agronomy. Demonstrations highlighting variety selection, fertility, pest monitoring, and management (insects, pathogens, and weeds) in wheat, corn, and soybeans were developed and maintained for multiple field day events. Over 2,000 direct participants were reached with in person content, and multiple articles were published in outlets that reach over 3,000 readers.

Extension in Spanish. One fruit and vegetable presentation given in Spanish to ~65 people, blog posts approximately twice a month that are reaching a growing readership of more than 3,000 people. Members from each team have been contributing. For example, 8 blogs on pollination, one on assessing risk of household chemicals, and a blog on the 5,000,000 trees project.

Training the Next Generation. Teams continue to include undergraduate and graduate students in their Extension efforts. Beyond the many hands on applied technical skills students built, they also presented and authored Extension outputs, including first author peer-reviewed fact sheets. More than 15 undergraduate, 12 graduate, and 2 post-doctoral trainees were involved in our programming.

Pennsylvania Integrated Pest Management (PAIPM) Program Report to NEERA 2023

John Tooker, IPM Coordinator, Professor of Entomology
tooker@psu.edu

PAIPM is a diverse program that spans agricultural and urban systems. For the past few decades, Ed Rajotte has directed the PAIPM program, but Ed will be retiring at the end of April 2023. Starting in fall of 2022, John Tooker, Professor of Entomology at Penn State, transitioned to become the State IPM Coordinator and Director of the PA IPM program.

Listed below are some activities of the programs supported by EIPM in Pennsylvania with project leaders listed. These activities are not inclusive but provide some of the key activities pursued in the last year and some of their outcomes. All programs also leverage other outside funding from federal, state, and non-governmental organization sources. In addition, to these programs, there are IPM programs in most Pennsylvania agricultural commodities including horticultural crops, animal production and the green industry. I hope to report on activities in some of these other commodities as I get a better understanding of all the activities underway.

Community IPM in Philadelphia **Dion Lerman – PA IPM Staff**

Urban IPM Technician Training, with ECA

Working with ECA, a local NGO providing building trades training, the PA IPM Program received a US EPA Environmental Justice grant for an innovative program to train residents on North Philadelphia, one of the city's poorest areas (with 100% of homes pest-infested, according to a Department of Health survey), and primarily Black and Latinx populations, as Urban IPM Technicians. This unique program responds to persistent pest and pesticide-use problems in the community, and the city at large, which is also experiencing a severe labor shortage in the pest control industry, and with growing and long-term needs. Pests are nuisances but more importantly, are health threats, particularly mice and cockroaches which are the most important triggers of asthma in urban areas; 25% of Philadelphia children have asthma – over twice the state and national averages. The program is built around the Entomological Society of America's new Certified IPM Technician standard, and the Pennsylvania Licensed Pesticide Applicator training and certification. It includes hands-on treatment of homes in the community and provides program graduates and opportunity to intern with local pest management professionals. The intent is to make the training an ongoing part of Philly Works, the city's job development system, and create a pipeline of trained technicians. The final curriculum will be published, allowing it to be replicated elsewhere.

In fall 2022, the first cohort of six student finished five weeks of training and graduated from the program. All of the graduates qualified for their credentials, passed their state exams, and within a month of the end of training secured employment or applied to open their own business. This program is providing sustainable careers for neighborhood residents (with some of the highest unemployment rates in the city), and direct service to residents whose homes will be treated as part of the training, and a pipeline of trained technicians for the growing non-profit

home renovation programs in Philadelphia, which plan to renovate over 10,000 low-income homes over the next 10 years.

As second cohort of around 16 students is currently (March 2023) taking the training, which will culminate with a job fair that will be attended by local pest control companies who will have a chance to get to know the new graduates. We are seeking additional funding to ensure the training can continue in coming years.

Medicare Reimbursement for Pest Control for Disabled Adults: Partnership with Liberty Resources

PA IPM facilitated implementation of new Medicare/Medicaid reimbursement for pest control in homes of disabled adults in Philadelphia (approximately 45,000 in the metro area). The Program initiated conversation with the managed care organizations (MCO's), who administer the benefit, and disabled advocates that led to a partner agency, Liberty Resources, to act as broker for local pest management providers to provide the service. PA IPM serves as Technical Director, providing training, technical assistance, and quality assurance. Service began just before the COVID-19 shutdown, which delayed full implementation. In 2022, the program returned to speed and as of 12/30/2022, the program has treated 173 homes, with 80% reporting successful elimination of the pest in a single visit, and complete customer satisfaction.

Bed bugs were the most common pest treated, accounting for over 43% (n=75) of treatments; only about 11 (15%) homes required retreatments. Cockroaches (n=67, or 39%) were the next most common pest treated, with mice (n=66; 33%) rounding out the top complaints. Mice actually required more re-treats (17%) than bed bugs. Only 23% (n=40) of treatments involved more than one pest; cockroaches and mice were the most common combination (n=18; 10% of treatments), followed by bed bugs and cockroaches (10; 6%). "Other" pests, squirrels, fleas, and raccoons, required treatment in one or two cases each. Rats were rare: only 7% of treatments, but they did co-occur with cockroaches (n=3) and with cockroaches and mice (n=2) "Triple threat" infestations were rare: only four were treated.

This program has been very successful, with the MCO's gradually increasing referrals and participation. The other regions of the state would like to emulate it, but the shortage of IPM practitioners has forced the use of conventional pest controls, with less satisfactory results, although there has yet been no formal comparison.

Agricultural IPM

IPM for Spotted Lanternfly

Dr. Julie Urban, Associate Research Professor

Dr. Urban's research group completed their third year of spotted lanternfly trapping study to test the efficacy of circle traps placed on several different tree species. Results will be combined with those from collaborators' sites in Virginia and New Jersey to improve monitoring of SLF across its life cycle. Urban's group also performed experiments to determine cold tolerance of first instar nymphs of spotted lanternfly. Results from this work will inform potential distribution of SLF to other areas beyond currently infested regions and will inform best management practices to limit SLF survival when inadvertently transported in shipping of various goods. Lastly, Urban's group also performed the third year of host plant suitability testing of various specialty crops to identify those upon which SLF can successfully feed and survive and may be at risk for damage. Results indicated that crops that are suitable hosts for adult SLF and for which we

documented some evidence of feeding damage include: hops, peach, raspberry, cultivated *Vitis vinifera* (Chardonnay and Riesling varieties), *V. labrusca* (Concord grapes), and kiwi fruit (potential damage from sooty mold, not feeding). Feeding by adult SLF causes more damage compared to other life stages. Nymphs have a broad host range with good survival (but low damage) on: peach, avocado, kiwi fruit, fig, hops, raspberry, cucumber, pumpkin, and watermelon.

IPM in Agronomic Crops

John Tooker, Professor of Entomology

We continued our efforts to promote IPM in field crop production. Over the past year, we leveraged results of our field research to emphasize the combination of cover crops and IPM for improving natural-enemy driven control of corn, soybeans, and small grains. We often also connect this message to “soil health,” which resonates with farmers who are interested in actively improving their soil quality to capitalize on the principle that healthy soils will produce healthy plants. In addition to this extension messaging on IPM, we also made two significant efforts to track pest populations with the expectation that information on local pest populations can encourage folks to adopt IPM and deploy pest management tactics or not based on actual, rather than perceived, risk. First, we used pheromone traps to detect migrating populations of black cutworm, which is a significant pest of corn. We detected “significant flights” of black cutworm moths at five locations in Pennsylvania. We shared details of our captures and information on when to scout via Penn State’s online newsletter, which is distributed to over 11,000 recipients every week during the growing season. Second, we focused on soybean production, where we have a 11-yr project to scout sentinel soybean fields and report the pests that are active and how severe the pest population is. This project is funded in part by the Pennsylvania Soybean Board and is a collaboration with county-based extension educators and local farmers. The main goal of the project was to encourage growers to adopt Integrated Pest Management by providing growers with local assessment of insects and diseases active in soybean fields across the state. This effort benefits farmers by exposing them weekly to realistic, unbiased assessments of populations of insects and diseases in soybean fields. Educators scout “typical” soybean fields that are grown without insecticides and fungicides and make weekly reports that are compiled and shared online. Over 11 years of the project, only three fields out of about 210 field years (1.4%) have needed insecticides and no fields have needed fungicides. By exposing farmers with first-hand reports of pest populations in their field, we expect farmers to see the value of IPM for limiting unnecessary inputs.

IPM in Grape production

Flor Acevedo, Assistant Professor of Entomology

Acevedo’s research group conducted research in northwest Pennsylvania on the following topics: 1) Larval parasitoids of caterpillars of grape berry moth. They collected three different parasitoid species: *Glypta mutica* & *Enytus obliteratus* (Hymenoptera: Ichneumonidae), and *Bracon scrutator* (Hymenoptera: Braconidae) that can potentially be used for controlling grape berry moth. 2) Gut-associated microorganisms in grape berry moth caterpillars that were feeding on immature and mature grapes. They found a larger abundance of fungi in the guts of larvae fed on mature grapes, identification of these organisms suggests the possibility of grape berry moth spreading fungal diseases in grape clusters late in the season. 3) Effects of different grape cultivars alone and in combination with the tree of heaven on spotted lanternfly survival. They

found that *Vitis rotundifolia* (muscadine grapes) were a less suitable host for spotted lanternflies than *Vitis labrusca* (Concord), and *Vitis vinifera* (Cabernet Franc and Chardonnay). This is important for insect management and indicates that *Vitis vinifera* growers need to be more alert to spotted lanternfly infestations. 4) Estimated economic thresholds for the management of spotted lanternfly in *Vitis vinifera*. This is a multiyear study currently in progress, 2022 was the first season. Preliminarily, spotted lanternfly infestations did not affect yield during the first year of infestation, but there seem to be effects on wine quality.

Acevedo's group delivered nine extension talks to grape growers (n = 396), extension educators (n = 423), and the general public (n = 135) about spotted lanternfly research, identification and basic biology, and management in grape. These presentations enhanced knowledge of ~ 954 people on spotted lanternfly identification, basic biology and management in grape.

Beekeeping and Pollinator Protection

Margarita Lopez-Urbe, Assistant Professor of Entomology

Dr. Lopez-Urbe's group conducted research to:

- 1) optimize protocols and recommendations for organic beekeeping management practices based on IPM approaches and the application of organically approved chemicals to control pests in colonies. This work demonstrated that organic beekeeping management systems support healthy and productive honey bee colonies.
- 2) Empirically demonstrated the role of brood breaks as a possible cultural strategy to control varroa mites in honey bee colonies.

Livestock and wildlife-related IPM

Erika Machtinger, Assistant Professor, Dept. of Entomology

Dr. Machtinger's group conducted research to:

- 1) (with Thermacell, Inc.) Improve the effectiveness of tick tubes as a host-targeted method of tick control by investigating the small mammal use of tubes by density and season. Findings were used to develop better deployment instructions for homeowners to reduce the risk of tick bites.
- 2) Examine biting flies on integrated animal facilities such as swine and cattle to gain a better understanding of animal-associated flies and their distribution, which informed improved management practices.
- 3) Evaluate use of permethrin on horses to determine its effectiveness as a tick repellent and its potential for causing equine dermal reactions. This work led to improved recommendations for horse owners on how to protect their animals from tick bites.
- 4) Investigate impacts of repellent-treated hunting gear on deer behavior to determine whether deer could perceive odors. This research informed improved tick bite prevention messaging for hunters.
- 5) Understand effects of prescribed burning on tick infestations on small mammal hosts and questing ticks. Although results are still being analyzed, it appears that burning did not have a significant effect on tick populations, and pathogen presence may have actually increased, suggesting that prescribed burns may not have long-term effects on tick populations.