

Northeastern IPM Center



Annual Report

2022

From the Director

The Northeastern Integrated Pest Management Center (the Center) is one of four regional integrated pest management (IPM) centers that cover the country, providing leadership, networking, partnership-building, and funding aimed at expanding the efficacy and practice of IPM.

The Center is based at Cornell University, within Cornell Cooperative Extension Administration, and serves the 12 states of the Northeast and the District of Columbia.

All four centers receive core funding on a four-year cycle through the Crop Protection and Pest Management (CPPM) line of the United States Department of Agriculture's National Institute of Food and Agriculture (USDA-NIFA) budget. Our most recent award began in September 2022. The Center supplements that funding with participation on proposals developed by partners working on IPM issues. In the past eight years, the Center has participated in two major USDA-NIFA Specialty Crop Research Initiative awards, one on brown marmorated stink bug and one on spotted lanternfly. Both proposals were outcomes of working group awards from the Center to key researchers on these issues, helping them leverage the additional funds. We are regularly invited to participate in proposals by our partners and anticipate additional funding in the future.

The CPPM line also funds the Extension Implementation Program (EIP), which supports the state IPM programs, and the Applied Research and Development Program (ARDP), through which researchers can seek funds.

The state IPM programs, based at land-grant universities in the Northeast, are members of a USDA-approved multistate project, NEERA-2104, as is the Center. NEERA-2104 provides an additional structure for networking, collaborating, and reporting on IPM activities in the Northeast. The Center provides logistical support to NEERA-2104 and reports out to the group on its own activities.

The topics and programs highlighted in this report illustrate the impact of the Center on the study and implementation of IPM through our activities in 2022. Funding distributed through our Partnership Grants Program, support through web development and communications networks, and educational events such as our *IPM Toolbox* webinar series have resulted in leveraged additional funding, stronger collaborations, and greater visibility for the work being conducted in the Northeast.

A major initiative starting in 2022 was the launch of a webinar series to highlight and foster diversity, equity, inclusion, and justice in IPM. We have invited presenters from historically marginalized groups to discuss topics related to their research, or to share their perspectives on overcoming barriers and succeeding in their chosen profession. Some presenters are graduate students,



Deborah G. Grantham, Director,
Northeastern Integrated Pest
Management Center

some are academics, and some are private sector experts in IPM. See www.northeast-ipm.org/ipm-in-action/deij-in-ipm/ for information on past and upcoming webinars. Our webinars are recorded and posted on the Center's YouTube channel ([youtube.com/@NortheastIPM](https://www.youtube.com/@NortheastIPM)).

The 1-to-20 return-on-investment ratio for the last four years alone highlights the efficacy and value of our Partnership Grants Program. We illustrate the regional collaborations that our funded projects are built on. And we show the range of IPM topics addressed by our partners in the Northeast and

beyond, including impacts on human well-being and health. Impact statements specify the gains of the projects we support and the leveraged impacts, including the rippling out of knowledge as well as additional funding acquired.

In addition to this regional work, we also administer the StopPests in Housing Program, which operates on a national level with funding from the U.S. Department of Housing and Urban Development (HUD). Center employee Susannah Krysko coordinates and manages the program. HUD-subsidized housing authorities across the country receive training and technical assistance on IPM in their buildings, and further education is available to the community at large via webinars, blogs, and educational materials developed by the program.

The team is close knit and our roles are highly complementary, with Jerrie Haines as program/extension aide, Jana Hexter as grants manager, Kevin Judd as web administrator, Susannah Krysko as coordinator/manager of the StopPests Program, David Lane as evaluator, and Mike Webb as communicator.

Immediate partners include the northeastern state IPM program coordinators, our Advisory Council, USDA-NIFA, the other regional IPM centers, Northeast SARE, other state and federal agencies, and private-sector experts and practitioners. The work could not be accomplished without these partners, but the Center plays a critical role in bringing together many collaborators to build effective and strong networks.

I hope this report gives you a sense of the value of the Northeastern Integrated Pest Management Center and of some of our operating methods.

Please contact us (www.northeastipm.org/about-us/contact/) for more information or if you would like to know how to be involved.

Deborah G. Grantham
Director, Northeastern Integrated Pest Management Center

Diversity, Equity, Inclusion, and Justice in IPM

In fall 2022, the Northeastern IPM Center launched a *Diversity, Equity, Inclusion, and Justice in IPM* initiative by hosting a series of webinars intended to highlight and foster diversity in IPM.

The webinars were offered as part of the Center's longtime *IPM Toolbox* webinar series, discussed in greater detail elsewhere in this report.

We invited presenters from historically marginalized groups. They shared their perspectives on overcoming professional barriers or discussed their research interests.

The presentations were recorded and posted on the Center's YouTube channel (youtube.com/@NortheastIPM).

Why DEI?

The Center joins numerous peer and partner organizations in recognizing the active role we can play in championing and advancing diversity, equity, inclusion, and justice (DEIJ).

This follows from a broadening awareness that DEI is not an isolated area of advocacy, but rather a foundational component of every endeavor, profession, field, and discipline. When capable people are implicitly or explicitly excluded because of their identities, talent and opportunities go to waste and dreams and goals go unrealized—individually and collectively. A commitment to DEI helps both people and organizations fulfill their potential.

Diversity as a Center Priority

The Center has recognized *Diversity in IPM* as a cross-cutting issue that undergirds everything we do. Our commitment to this philosophy should be reflected throughout the research we fund, the extension work we facilitate, and the communication we coordinate.

The *Diversity in IPM* webinar series supports this mission in several ways:

- **Overcoming obstacles:** Presenters discuss how their traditionally marginalized identities have shaped the lived experience of becoming and being professionals in IPM and related fields. This includes challenges and barriers but also victories and success stories.
- **Visibility and representation:** In efforts to overcome marginalization, representation matters. We aim to provide an opportunity for people from historically marginalized groups to see others that look, think, or identify as they do in positions of success and accomplishment in IPM and related fields. In so doing, we hope to encourage aspiring professionals to consider careers in these fields, especially if they might otherwise



Presenters (left to right): Mahfuz Rahman, Krystal Monique Toney, Ryan Gott, Dwayne Joseph, and Katie Hartmann

have been dissuaded for fear that their marginalized identities would make it prohibitively difficult or unrewarding.

These webinars and related measures are a work in progress and we welcome collaborators, ideas, and feedback to help them strengthen and grow over time.

DEIJ Webinars Hosted in 2022

The Center hosted the following webinars as part of the *Diversity in IPM* series throughout fall 2022. For more information, including links and viewership statistics, see the *IPM Toolbox* section of this report.

- **Expanding the Integrated Weed Management Toolbox: Evaluating IWM Approaches for Maryland and Mid-Atlantic Vegetable Production Systems** – Dwayne Joseph, Agriculture and Food Systems Agent (*Kent County, Maryland*)
- **As I Heal, So Does the Land: A Story About Blackness, Conservation, and Healing in America** – Krystal Monique Toney, Author, PhD Student in Environmental Science (*University of North Texas*)
- **Utilization of Biologicals and Biofumigation for Effective Management of Soilborne Diseases in Fruits and Vegetables** – Mahfuz Rahman, Plant Pathologist & Extension Specialist (*West Virginia University*)
- **Cooperative Extension in Indigenous Communities: Experiences of Educators** – Katie Hartmann, Adjunct Assistant Professor (*Agriculture Education and Studies Department, Iowa State University*)
- **Non-traditional Areas for IPM Careers and the Associated Challenges for 2SLGBTQIA+ Individuals in Pursuing Them** – Ryan Gott, Fellow (*Longwood Gardens*)

Future Webinars and Other Opportunities

The *Diversity in IPM* initiative will be ongoing and more webinars will be added. For the most up-to-date list or to register for any upcoming webinars, visit www.northeastipm.org/ipm-in-action/deij-in-ipm/, which also features links and resources pertaining to DEI in IPM and related fields.

We are exploring options for making some live webinars available in both English and Spanish.

StopPests in Housing Program

The StopPests in Housing Program is a national program administered by the Northeastern IPM Center with separate funding from the U.S. Department of Housing and Urban Development (HUD). The program promotes integrated pest management in HUD-assisted housing by providing training, technical assistance, and web- and print-based resources, including trainings and webinars.



Of note, in 2022, StopPests found there was continued high demand for on-line training, which the program had previously begun offering more extensively in response to the COVID-19 pandemic.

- **Sites Trained:** Considering both online and in-person trainings in aggregate, StopPests trained 27 sites in 2022, from the Northeast to the west coast and even in the U.S. Virgin Islands.
- **Technical assistance in IPM implementation:** Housing organizations reached out for resources and technical assistance, and StopPests responded to sites spanning the U.S. with contract advice, IPM recommendations, and resident resources.
- **Webinars:** StopPests presented and hosted five webinars in 2022.
- **Conferences and speaking engagements:** Throughout 2022, StopPests was a featured presenter at three conferences and events.

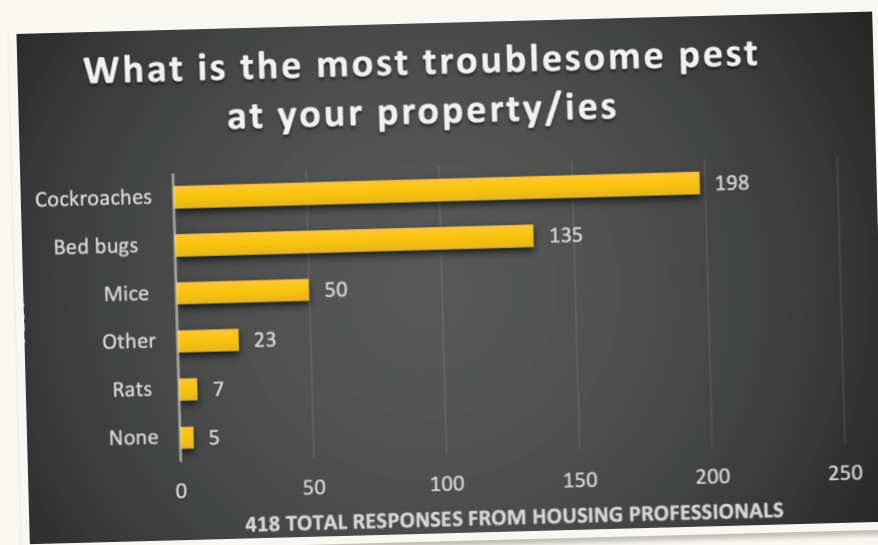
A survey of 418 housing professionals who attended the online trainings indicated that cockroaches are by far the most troublesome residential pest, followed by bed bugs and then mice as a distant third.

Many StopPests webinars are of potential interest to the general public and recordings are freely available to view. See stoppests.org/go/webinars for more information.

Subaward: Case Study with University of Minnesota

In 2022, StopPests granted a research subaward to Stephen Kells, PhD, of the University of Minnesota.

The purpose of this project was to look at pest management across an organization, not individual buildings, to make decisions about pest-control resource allocation. The goal was to learn how to provide consistency of service and early detection, and to use data to prioritize, plan, and test with pilot programs.



The University of Minnesota provided data analysis, staff training, in-field observations, monitor setup, annual assessments, and monthly discussions with in-house pest-management staff and managers from the Minneapolis Public Housing Authority.

The study arrived at four main conclusions about how to improve pest control success across an organization:

- **Standardize expectations for pest control technicians to provide thorough service.** Communicate and allow for technicians to spend more time in chronic apartments with fewer work orders per day. Break out subtypes into detailed treatment and prevention work orders so the organization can measure a drop in pest treatments when preventative work like exclusion is done.
- **Develop adjacent-apartment inspections protocols for all pests.**
- **Use pest complaints to prioritize more infested buildings** and allocate resources and time to doing an effective job.
- **Resident education works**, but it has to be regularly repeated.

To watch Kells present his study findings, watch the recorded webinar at stoppests.org/go/3steps.

Funded Projects & Leveraged Funding

Most years, the Northeastern IPM Center funds projects through its IPM Partnership Grants Program. For 2022, funding was also awarded through the Center's Pest Management Strategic Plans and Production/Management Profiles Grants Program.

IPM Partnership Grants

Each year, the Center distributes small-grant funding through its IPM Partnership Grants Program. Funded projects must foster the development and adoption of IPM, address or identify regional priorities, and benefit the northeastern region at large.

Through a competitive request-for-applications (RFA) process, the program distributes funding to projects that fall under one of three categories: **applied research, communications, and working groups**. The RFA is announced and opened in the fall of the preceding year and funding begins the following spring.

Most years, the Center funds projects that are up to 24 months in duration, but because the Center was reaching the end of a funding cycle in 2022, projects were limited to one year and the total funding distributed under the program was limited to \$100,000.

Projects Funded in 2022

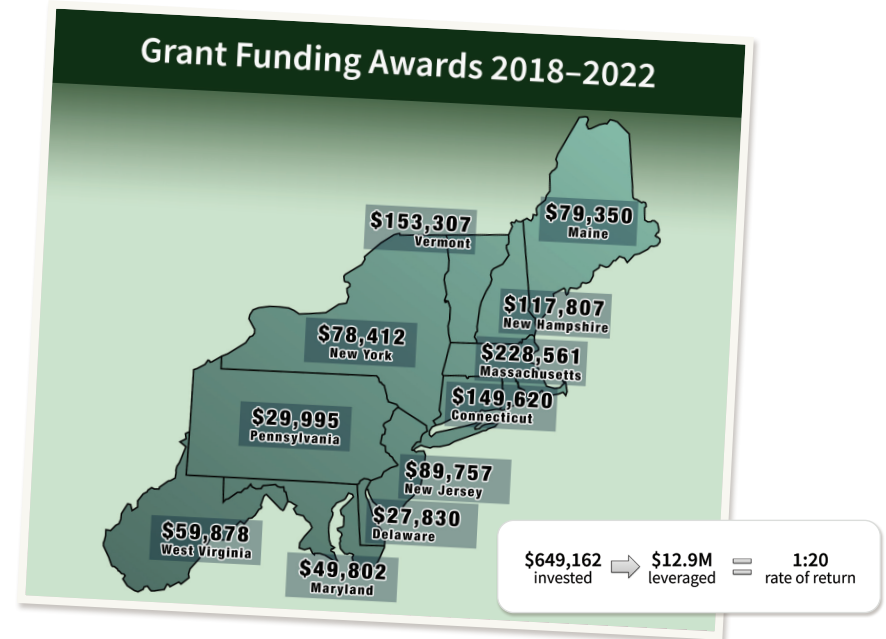
Following is the name of each project funded in 2022 along with its project director (PD) and their host institution. All funded projects in this cycle fell under the **applied research and communications categories**.

Applied Research

- **Educating the next generation of extension through experiential learning of applied research through evaluating of efficacy and financial viability of water sprout removal for pear psylla IPM in three New England states** (*Elizabeth Garofalo, UMass Amherst*)
- **Operationalizing eDNA technology for disease vector mosquito surveillance and control** (*Allison Gardner, University of Maine*)
- **A systems approach to developing IPM for cattle producers in the Northeast; social, environmental, and economic analyses** (*Heather Darby, University of Vermont and State Agricultural College*)

Communications

- **IPM is for everyone: Enhancing the reach and impact of a virtual IPM education series** (*Matt Frye, New York State IPM Program, Cornell University*)



Supporting Projects Across the Northeast

The Center's remit includes fostering IPM adoption throughout the Northeast, which includes 12 states and the District of Columbia. As such, the Center makes every effort to ensure that the funding it distributes equitably serves the interests of the entire region, and each year, PDs throughout the Northeast are encouraged to apply.

Leveraged Funding: Indirect Power of Smaller Grants

Projects funded through the Partnership Grants Program often prove highly successful or shine a spotlight on bigger challenges in need of further exploration. PDs and their teams might then use what they have achieved with Center funding to make the case for larger grants that enable them to continue and expand their work.

Through this leveraged-funding approach, during the Center's 2018-2022 funding cycle, Partnership Grant recipients have used \$649,162 in Center funding to leverage over \$12.9 million in additional funding for the PDs, their partners, and their institutions. That represents a 1-to-20 rate of return.

Two Pests and a Case Study in Leveraged Funding

The power of leveraged funding is vividly illustrated by the efforts against two of the most troublesome invasive species to proliferate in recent years: the brown marmorated stink bug and the spotted lanternfly.

Projects dedicated to combating both pests began as Center-funded working groups that later went on to secure Specialty Crop Research Initiative funding

directly from the USDA's National Institute of Food and Agriculture—the same agency that funds the Center—to continue their work.

Pest Management Strategic Plans and Production/Management Profiles

The Pest Management Strategic Plans (PMSPs) and Production/Management Profiles (PMPs) Grants Program aims to fund new and updated PMSPs and PMPs.

PMSPs and PMPs, Defined

PMSPs are developed with a regional group of growers and other stakeholders in the Northeast to identify the needs and priorities of a particular commodity, system, or setting requiring pest management. The plans document current pest-management practices and those under research-and-demonstration trial development.

PMPs provide the production or management story, including current pest-management practices, for a particular system—such as production of an agricultural commodity—and look at current research activities directed at finding IPM strategies.

Coordinating Funding Opportunities

The Center typically funds PMSPs and PMPs outside the Partnership Grants cycle, but for 2022, both RFAs were announced concurrently in hopes of eliciting a broad array of suitable applications.

This PMSP/PMP RFA specifically sought plans for crops, livestock, forestry, or other systems that do not have a plan, or for updates to outdated PMSPs or PMPs (those that are more than five years old), and offered a total of \$30,000 in funding with a maximum of \$15,000 per award.

Funding Recipients

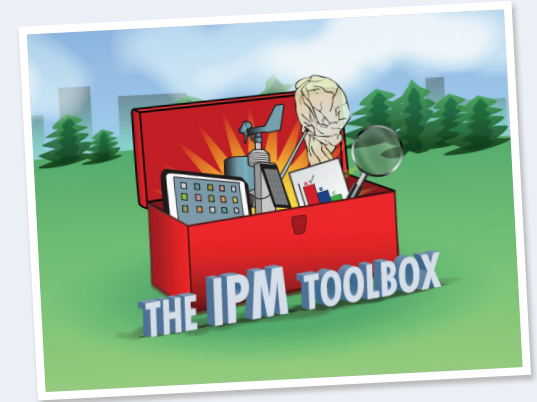
- **Production/management profile for arthropod pests of horses in Maine** (*Allison Gardner, University of Maine*)
- **Hemp production/management profile for New York State** (*Marion Zuefle, New York State IPM Program, Cornell University*)

Additional Information

- IPM Partnership Grants Program: neipmc.org/go/bfgs
- PMSP/PMP Grants Program: neipmc.org/go/pmsp-rfa

IPM Toolbox Webinar Series

The Northeastern IPM Center's *IPM Toolbox* webinar series invites experts for hour-long conversations to present—and engage the audience in dialogue—about an IPM practice, method, or effort. The webinars are free and open to the public. Some are geared toward practitioners in a specific agricultural or pest-management field while others may be of interest to anybody.



Past webinars are posted on the Center's YouTube channel (youtube.com/@NortheastIPM). Recordings, along with downloadable presentation slides, are also available on each webinar's individual page.

Topics have run the gamut from pests to pollinators and sustainable agricultural practices to IPM outreach for marginalized communities. They have highlighted timely issues such as spotted lanternfly, ticks, varroa mites, mice, cockroaches, and pest-management methods for emerging agricultural industries.

For 2022, the fall *Toolbox* webinars were part of the Center's new *Diversity, Equity, Inclusion, and Justice in IPM* initiative, discussed in greater detail elsewhere in this report.

2022 Toolbox Webinars

Spring

Tarping in the Northeast: A Guide for Small Farms

- **Date:** March 16, 2022
- **Presenter:** Sonja Birthisel, Faculty Associate (*School of Forest Resources and Ecology and Environmental Sciences Program, University of Maine*)
- **Learn more or view recording:** neipmc.org/go/fxHS
- **Registration and viewership statistics:**

Registrants: 126 / Live attendees: 60 / Recording views*: 43

Pesticides: Part of the IPM Toolbox

- **Date:** March 30, 2022
- **Presenters:** Mary Centrella, Director; Dan Wixted, Extension Support Specialist (*Cornell Cooperative Extension's Pesticide Safety Education Program*)
- **Learn more or view recording:** neipmc.org/go/tFnB
- **Registration and viewership statistics:**
Registrants: 152 / Live attendees: 91 / Recording views*: 120

Combating Slugs as Pests of Soybeans and Corn

- **Date:** April 6, 2022
- **Presenters:** David Owens, Extension Specialist (*University of Delaware*); Sally Taylor, Associate Professor & Field Crops Entomology Extension Specialist (*Tidewater Agricultural Research and Extension Center*)
- **Learn more or view recording:** neipmc.org/go/myMk
- **Registration and viewership statistics:**
Registrants: 69 / Live attendees: 48 / Recording views*: 48

Taking a Closer Look: How Strawberry Disease Risk Varies with Microclimates at the Canopy Level

- **Date:** May 4, 2022
- **Presenter:** Mengjun Hu, Assistant Professor (*Department of Plant Science and Landscape Architecture, University of Maryland*)
- **Learn more or view recording:** neipmc.org/go/wgeh
- **Registration and viewership statistics:**
Registrants: 14 / Live attendees: 8 / Recording views*: 39

Fall: DEIJ Series

Expanding the Integrated Weed Management Toolbox: Evaluating IWM Approaches for Maryland and Mid-Atlantic Vegetable Production Systems

- **Date:** September 12, 2022
- **Presenter:** Dwayne Joseph, Agriculture and Food Systems Agent (*Kent County, Maryland*)
- **Learn more or view recording:** neipmc.org/go/cAPk
- **Registration and viewership statistics:**
Registrants: 59 / Live attendees: 34 / Recording views*: 28

As I Heal, So Does the Land: A Story About Blackness, Conservation, and Healing in America

- **Date:** October 4, 2022
- **Presenter:** Krystal Monique Toney, Author, PhD Student in Environmental Science (*University of North Texas*)

- **Learn more or view recording:** neipmc.org/go/htPM
- **Registration and viewership statistics:**
Registrants: 71 / Live attendees: 48 / Recording views*: 23

Utilization of Biologicals and Biofumigation for Effective Management of Soil-borne Diseases in Fruits and Vegetables

- **Date:** October 5, 2022
- **Presenter:** Mahfuz Rahman, Plant Pathologist & Extension Specialist (*West Virginia University*)
- **Learn more or view recording:** neipmc.org/go/fmRy
- **Registration and viewership statistics:**
Registrants: 56 / Live attendees: 30 / Recording views*: 93

Cooperative Extension in Indigenous Communities: Experiences of Educators

- **Date:** November 8, 2022
- **Presenter:** Katie Hartmann, Adjunct Assistant Professor (*Agriculture Education and Studies Department, Iowa State University*)
- **Learn more or view recording:** neipmc.org/go/SPEg
- **Registration and viewership statistics:**
Registrants: 66 / Live attendees: 40 / Recording views*: 23

Non-traditional Areas for IPM Careers and the Associated Challenges for 2SLGBTQIA+ Individuals in Pursuing Them

- **Date:** December 7, 2022
- **Presenter:** Ryan Gott, Fellow (*Longwood Gardens*)
- **Learn more or view recording:** neipmc.org/go/DdTk
- **Registration and viewership statistics:**
Registrants: 43 / Live attendees: 20 / Recording views*: 27

* Recording views are as of this writing and subject to increase over time.

Additional Information

For more information on the *IPM Toolbox* webinar series—including any upcoming webinars and archives of past presentations—visit www.northeastipm.org/ipm-in-action/the-ipm-toolbox/.

Research Update Conference

On March 24, 2022, the Northeastern IPM Center hosted an online research update conference intended to increase collaboration and awareness about current IPM-related research and extension throughout the Northeast in an engaging, interactive way.

The conference featured brief presentations from active IPM-related projects funded by one of several sources:

- The Center’s own IPM Partnership Grants Program
- The Northeast Sustainable Agriculture Research and Education (NE SARE) Program
- USDA-NIFA’s Applied Research and Development Program (ARDP) and Extension Implementation Program (EIP)

Featured speakers submitted five-minute prerecorded presentations in which they discussed one or two highlights from their projects. Live Q&A sessions were interspersed throughout.

The recording is available for viewing on the Center’s YouTube channel (youtube.com/@NortheastIPM) and on the conference page at neipmc.org/go/xMEs.

Speaker	Project Title	Affiliation	Funding Source
Jeffrey Berta	PA Queen Project and the HHBBC Field Test Mite-Biting Behavior Using Backyard Scientists	Dickinson College	NE SARE
Nicole Zlotnikov	Asparagopsis Seaweed Reduces Methane Emissions and Improves Microbiome	Z Farms Organics	NE SARE
Quan Zeng	Entry Points of the Fire Blight Pathogen <i>Erwinia amylovora</i> on Apple Leaves	The Connecticut Agricultural Experiment Station	Center
Erika Machingter	Biological Control Options for Fly Control in Poultry Facilities	Pennsylvania State University	NE SARE



Speaker	Project Title	Affiliation	Funding Source
Anna Wallingford	Attract-and-Kill Strategies for Sustainable Striped Cucumber Beetle Management	University of New Hampshire	EIP
Tyler Lesko	Flavonoids for Resistance against Plant Pests	Pennsylvania State University	ARDP
Sam Anderson	Twospotted Spider Mite IPM for Urban Agriculture	Cornell University	NE SARE
Changlu Wang	Assessing and Controlling House Mouse Infestations in Multi-Family Dwellings	Rutgers University	Center
Jason Smith	Oh Crap! Pasture Dragging Fails to Suppress Face Flies and Horn Flies in Pennsylvania Pastures	Milton Hershey School & Dickinson College	NE SARE
Veronica Yurchak	Creating an Ecofriendly Pest Suppression Program in Sweet Corn	University of Maryland	NE SARE
Christy Hoeping	Testing Ground Barriers for Swede Midge IPM on At-Risk Small-Scale Brassica Farms	Cornell Cooperative Extension of Orleans County	NE SARE

Review and Evaluation of Impacts

Partnership Grants and Leveraged Funding

Analysis of 2018–2021 completed Partnership Grant projects from the current Northeastern IPM Center funding cycle (2018–2022) shows that \$649,162 invested by the Center has helped lay the groundwork for project directors securing \$12,948,175 in additional funding for themselves, their partners, and their institutions.

As discussed further in the section of this report focusing on Partnership Grants, that amounts to approximately a 1-to-20 rate of return, but some individual projects greatly exceed this ratio. One noteworthy example is a project funded in 2021 and completed in 2022, “Early Season Soil Applications of Entomopathogenic Nematodes in High Tunnel IPM,” which received \$49,798 in initial funding but leveraged an additional \$3,704,495, for a ratio of 1-to-74.

This 2018–2022 aggregate data is current as of the end of 2022, based in part on final reports submitted to date for projects funded in 2021. These numbers are subject to change as final reports continue to be submitted.

Impact Statements

The Center develops and updates impact statements to explain and illustrate the beneficial outcomes of the work we fund. Impact statements are available on the Center website at neipmc.org/go/impacts.

Also available on that page is an impact statement template, which can be used to educate and train extension educators and others in the Northeast on how to better document IPM project impacts.

IPM Toolbox Webinar Polling

We have evaluated the impact of our *IPM Toolbox* webinars using Zoom polling data.

For 2022, we saw particularly encouraging responses to the post-webinar poll question, “As a result of this webinar, how likely are you to increase your implementation of IPM?” with a substantial majority of respondents indicating they were “extremely likely” (24%) or “very likely” (39%) to do so.

IPM News and Events Roundup

Our weekly *IPM News and Events Roundup* e-mail newsletter continues to be impactful, and we regularly receive compliments and kudos from recipients. Comments have included remarks on the amount of good information packaged in the *Roundup* and the wealth of opportunities it provides to people in various professions, both within the Northeast and in other regions as well.

IPM Adoption Perspectives from the Regions: Barriers and Recommendations

*David E. Lane¹, del97@cornell.edu, Tegan J. Walker², and Deborah G. Grantham¹
¹Northeastern IPM Center, Cornell University, Ithaca, NY; ²Southern IPM Center, North Carolina State University, Raleigh, NC

Introduction

- Increased IPM adoption hinges not only on the future of innovative research, but also on the willingness of growers to adopt new IPM technologies.
- Adoption and diffusion of innovations can encounter many different challenges.
- By better understanding the barriers to IPM adoption, future research, extension, and education can better target behavior change.

Methods

- This study sought to better understand the barriers to IPM adoption from the perspective of state IPM coordinators via an online Qualtrics survey.
- These professionals have a statewide perspective of IPM adoption.

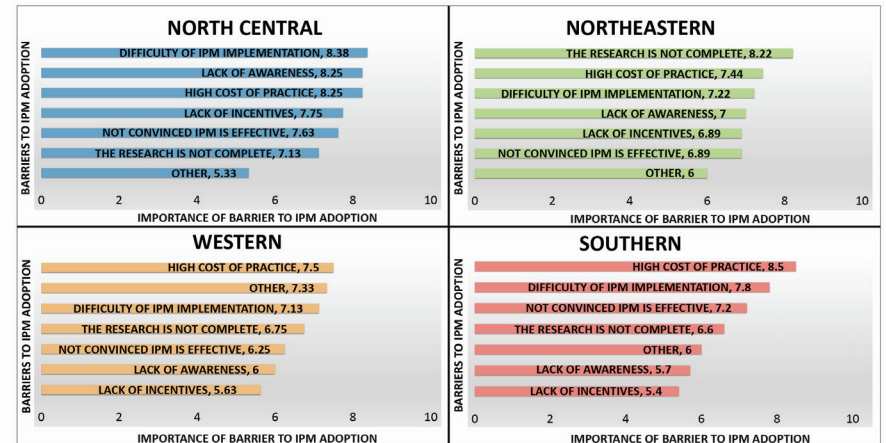
Results

- There were 37 completed surveys out of 56 email survey invitations, which equals a 66% response rate (88% with partially completed surveys).
- Overall, the participants ranked “high cost of practice” as the most critical barrier to IPM adoption.
- “Difficulty of implementation” and “lack of awareness” were also highly ranked as critical barriers to adoption.
- When asked about ways to increase IPM adoption, participants ranked “Improved cost-benefit analysis” as the most critically important.

Recommendations

- These findings demonstrate the importance of providing improved IPM economic cost-benefit analyses to accompany the promotion of new and existing IPM innovations.
- These data suggest the need for more comprehensive extension and education programs to address the perceived “high cost of practice,” “difficulty of implementation,” and “lack of awareness” because they are critical IPM adoption barriers.

IPM Adoption Barriers in the United States (By Region)



This work is supported by Crop Protection and Pest Management Program (CPMP) grant numbers 2018-70006-28882, 2018-70006-28883, 2018-70006-28881, and 2018-70006-28884 from the USDA National Institute of Food and Agriculture.

Survey results were analyzed to produce a poster, *IPM Adoption Perspectives from the Regions: Barriers and Recommendations*, for the 10th International IPM Symposium.

IPM Adoption Survey

In 2021, the Center designed and distributed a survey to state IPM coordinators throughout the country. The results of that survey have continued to inform ongoing projects and deliverables.

The survey questions were designed in collaboration with the Southern IPM Center and are categorized as:

- IPM adoption drivers and barriers
- IPM education and training
- Impacts of IPM
- Impact of regional IPM centers
- Sources of more IPM data

The survey results were analyzed to produce a poster, *IPM Adoption Perspectives from the Regions: Barriers and Recommendations*, for the 10th International IPM Symposium—held in March 2022—and an article, “IPM Adoption and Impacts in the United States,” written for publication in the *Journal of IPM* in early 2023.

Lessons learned from this survey have also helped us revise our Partnership Grants RFA to encourage proposals that contain cost-benefit analyses. These changes were first rolled out in the 2022 RFA.

Also, based on the survey questions, we are creating a standardized report form that can be used to systematically gather IPM activities, adoption, and impact data from the state IPM coordinators at the annual meeting of the Northeast Region Technical Committee on IPM (NEERA).

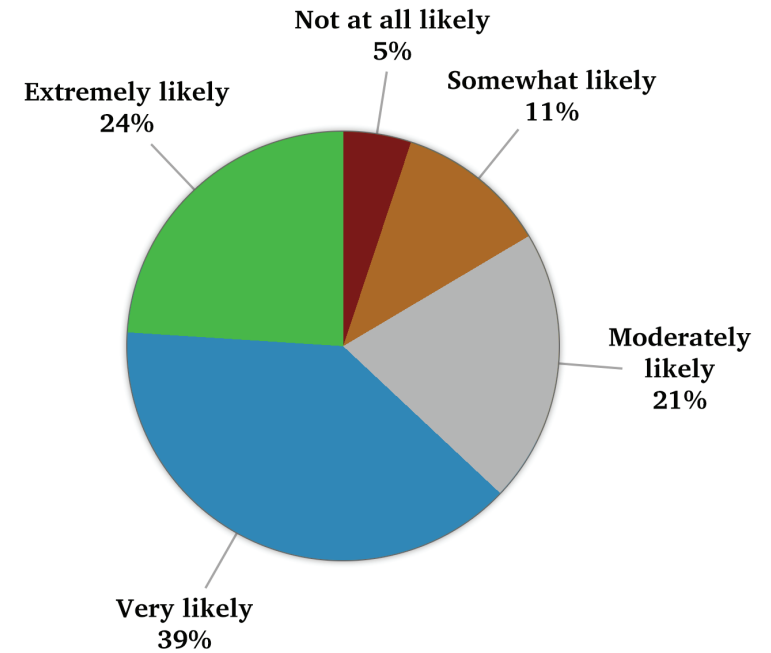
Common Measures

The Center led the completion of common measures that all four regional IPM centers can report against to improve evaluation efforts across the USDA National Institute of Food and Agriculture’s (USDA-NIFA’s) Crop Protection and Pest Management (CPPM) program, under which the centers are funded.

This means the common measures were designed for the entirety of CPPM. In addition to the Regional Coordination Program (RCP, effectively the regional IPM centers), this includes the Applied Research and Development Program (ARDP) and the Extension Implementation Program (EIP).

The common measures were implemented in the reporting questions within the new regional IPM centers grant-management system, which was formally launched in 2022. Starting in 2023, we will receive reports that will allow us to start measuring the aggregated outcomes and impacts of RCP, ARDP, and EIP.

As a result of this webinar, how likely are you to increase your implementation of IPM? (2022)



Additional Efforts

In 2022, we continued working with evaluation experts to identify and analyze existing evaluation data, such as the USDA National Agricultural Statistics Service (NASS) Chemical Use Survey.

We have also continued tracking responses to our publications and communications.

Partnership Grant proposals were reviewed for potential impacts—including changes in knowledge, attitudes, skills, and aspirations—as part of the award decisions. We continue to mine Partnership Grant project final reports for new tools and approaches to implementing IPM as well as highlighting results from working groups.

IPM Insights is the Northeastern IPM Center's flagship publication, featuring news from and about the Center. It includes updates on research and timely issues, success stories from funded projects, news about prominent figures in the world of IPM, useful resources, and funding opportunities, among other topics.

Insights is the product of a team effort involving writing, editing, content curation and amplification, and design and layout. Formerly a print-first publication that was also cross-posted to the Center's website, for the last few years, *Insights* has been published only in two electronic formats: as individual web pages for separate articles, and as a single downloadable PDF for an entire issue. However, the Center retains the ability to order small print runs upon request.

2022 Highlights

Center News and Funding Opportunities

- New projects funded through the IPM Partnership Grants Program and Pest Management Strategic Plans and Production/Management Profiles Grants Program, and a call for proposals seeking funding for the following year
 - This also included an illustration of how grants were awarded state-by-state throughout the Center's 2018–2022 funding cycle and the leveraged-funding ratio achieved up to that point
- New *IPM Toolbox* webinars, including DELJ-focused webinars announced as part of the Center's new *Diversity in IPM* initiative
- Call for nominations for the *Outstanding Achievements in IPM Award*
- Renewal of the Center's funding through USDA-NIFA
- Retirement of longtime program/extension aide Nancy Cusumano and arrival of Jerrie Haines to fill the position

Pests and Management Practices

- Ongoing news about the invasive spotted lanternfly (SLF), including an outreach program launched by the St. Lawrence Eastern Lake Ontario Partnership for Regional Invasive Species Management
- Using pest-mating disruptors to help limit populations
- A new guide on tarping supported by a Partnership Grant
- IPM methods to deter deer, a common cause of residential landscape damage

Pest-Mating Disruptors and IPM Lead to Better-Quality Fruit
By Maria Anderson, PhD, LEIS
U.S. IPM Center for Integrated Pest Management

Taking a spring ride in the country, past numerous fruit orchards, whose flower petals fall across my windshield like giant snowflakes. I am reminded of a time, a generation ago, when growers sprayed pesticides in the spring in orchards and on farms throughout the nation. Farmers would spray for pests, such as codling moths, before the trees' buds broke in the spring, then every 7–10 days thereafter.

The spraying occurred whether the pests were there or not because scouting crops for pest levels was not an established strategy. It eventually became clear that pests don't carry colorers and that their emergence varies from year to year. This validated the need for alternate pest control methods, including monitoring.

Researchers, in collaboration with farmers, have developed more targeted responses based on differences in pest emergence and life cycles, while reducing spraying has become less prevalent.

Spreading concern whether the pests were there or not because scouting crops for pest levels was not an established strategy. It eventually became clear that pests don't carry colorers and that their emergence varies from year to year.

Using Traps to Monitor, Control Pest Populations

Because fruit seasons approach with warming weather, it is time that codling moths (*Cydia pomonella*) and the oriental fruit moth (*Grapholitha molesta*) will soon follow. Today's growers monitor certain pests with the aid of traps designed to include a chemical lure to attract the targeted pest. The lures are often synthetic copies of the pheromones that females emit to attract the males for mating.

In apple orchards, traps such as the one pictured in Photo 2 are hung in the trees. The bottom of the trap is coated with an adhesive to

capture the male insects. The normal distribution per full-size tree is 10 pheromone traps. The traps should be hung in the upper third of the canopy and will keep attracting and catching moths for an entire growing season. These are an effective control tactic for apple pests in lieu of pesticide applications.

There are similar pheromone traps made for peaches and other trees. Likewise, there are similar mating disruption systems for several fruit moths, deepwood borers, peach tree borers, leaf-miners, and stink bugs. These pheromone mating disruption systems come as spirals, ropes, tubes, spray dispensers, clips, and dispensers that can be draped or baited onto tree branches. (See Photo 3.)

Altering Pest Behavior through Pheromones

Did you know that warm temperatures in the orchard can cause codling moths and other pest populations to double in a month by triggering females to lay more and larger eggs? This behavior is influenced by EPA-registered pheromones.

The male moths follow the pheromone plume to the dispersers, so by the time the males find the females, the females are older and not in reproductive.

Many of the EPA-registered mating disruptor products contain the behavior-modifying pheromone Disruptor, which is the mating-disruption pheromone affecting the behavior of codling moth, oriental fruit moth, and more.

There are also a number of EPA-registered behavior-modifying pheromones that disrupt the mating communication between adult male and female codling moths, stink moths, fruit moths, borers, and seed worms. Traps may also be baited with the scent pheromone for the Asian stink bug (*Leptoglossus phyllorhynchos*), and brown marmorated stink bug (*Halyomorpha halys*).

These are all good pest population monitoring strategies that can be used from emergence to late season.

Monitoring Informs Management Decisions

With regular trap monitoring (Photo 4), growers gain an accurate assessment of how many moths are out in the orchard, which in turn helps them determine if and when further treatment is necessary.

When a moth is caught, growers know that the first generation (one-mating generation) has flown. Then, they can calculate the number of days for the first generation eggs to hatch. At that point, growers make a decision for action. More traps provide more information and it is best to treat large orchard blocks with a quantity of mating

Photo 1. Apple blossoms in spring bloom. (Photo: Creative Commons)

Photo 2. A monitoring trap hangs in the upper canopy of an apple tree. (Photo: Gardening4all)

Photo 3. Similar mating disruption traps in fruit trees. (Photo: Stryker.com; Stryker)

Photo 4. Pheromone trap. (Photo: BioWooding)

Photo 5. Apple maggot damage. (Photo: U.I. Glass, NYAES, BioWooding)

Photo 6. Apple with a codling moth worm. (Photo: Ward Upham, Kansas State University, BioWooding)

Photo 7. Apple with a prominent larva in orchard. (Photo: Cornell.edu)

disruptors and associated traps, hung early in the spring, so pests are caught as they emerge.

Because codling moths like to congregate, they create "hot spots." Growers can indicate to growers where these "hot spots" are located, thus showing where more mating disruptors and/or other control devices should be deployed.

There is also an economic impact where growers use IPM. They stand and feel when they follow the five components of IPM:

- Pest prevention
- Scout
- Identify
- Monitor
- Control

Incorporating Pesticides into a Plan

Another effective use of pheromones is in combination with pesticides.

of the orchard and trees, cultural practices like traps, and the use of reduced-risk pesticides such as pheromone traps. IPM dictates that insecticides be used judiciously as part of an overall pest management program.

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Communication

In addition to the *IPM Insights* newsletter discussed in greater detail elsewhere in this report, the Northeastern IPM Center utilizes a number of other communication channels and platforms to distribute and share news and resources about integrated pest management and related topics—in the Northeast and beyond.

Websites

NortheastIPM.org – Our main website for promoting and funding IPM in the Northeast

StopPests.org – Training materials, pest solutions, and advice for implementing IPM in multifamily housing

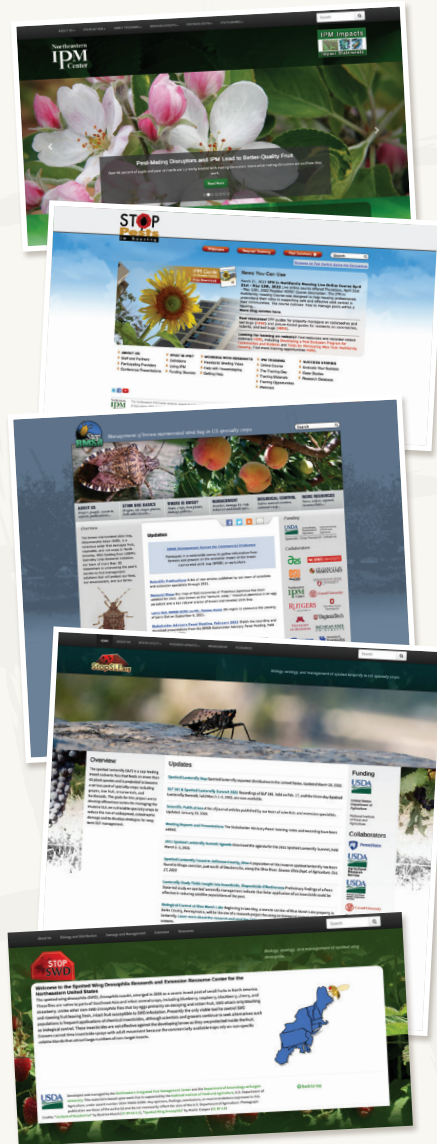
StopBMSB.org – Biology, ecology, and management of brown marmorated stink bug in specialty crops

StopSLF.org – Biology, ecology, and management of spotted lanternfly in specialty crops

StopSWD.org – Biology, ecology, and management of spotted wing drosophila in specialty crops

IPM News and Events Roundup

The *IPM News and Events Roundup* is a weekly e-mail newsletter sent to the Northeastern IPM Center's primary communications e-list. The *Roundup* does not contain any content of its own, but rather is a compilation of links with summaries to outside sources about IPM-related news, research, resources, webinars, meetings, events, job opportunities, and more.



Website	Visitors, 2022
NortheastIPM.org	53,126
StopPests.org	20,020 + 14,432 blog
StopBMSB.org	53,553
StopSLF.org	8,226
StopSWD.org	329

The *Roundup* is a mostly plaintext e-mail newsletter that was launched in January 2019. Along with the Center's *IPM Insights* newsletter, the *Roundup* is part of a two-pronged periodical publication strategy, with the *Roundup* filling a different niche through its up-to-the-minute weekly schedule, compilation-based structure, and simple layout.

Past issues are archived on the Center's website at neipmc.org/go/HbdR.

Communications E-list

The Center maintains a primary e-mail communications list. As of this writing, the list has 2,955 subscribers.

The list is for Center announcements—not discussion—and traffic is intentionally kept to a minimum. In addition to the weekly *Roundup*, the list is used to distribute occasional messages about Center news and events.

Anybody may request to be subscribed to the comm list by e-mailing northeastipm@cornell.edu.

Social Media

The Center is active on social media platforms including Facebook, Twitter, and YouTube.

Facebook and Twitter feature posts about Center news and shares of IPM-related content from media outlets and partner organizations. YouTube is an extensive repository for recordings of webinars, conferences, and meetings presented or hosted by the Center.

- **Facebook:** www.facebook.com/NEIPMCenter/
- **Twitter:** twitter.com/NortheastIPM
- **YouTube:** youtube.com/@NortheastIPM

Advisory Council and Steering Committee

The **Advisory Council** provides a broad vision to guide the Northeastern IPM Center. Members represent a wide range of stakeholders, linking the Center to stakeholder needs and priorities for pest management programs. Advisory Council members are also an important avenue for Center outreach to their constituencies and beyond. The **Steering Committee** is the Center's policy-setting body, providing direction for timely and effective Center management.

Name	Affiliation	State
Rakesh Chandran	West Virginia University	WV
James Dill	University of Maine	ME
Carol Glenister	IPM Laboratories	NY
Deborah Grantham*	Cornell University	NY
George Hamilton	Rutgers, The State University of New Jersey	NJ
Glen Koehler*	University of Maine	ME
Bob Mann	National Assoc. of Landscape Professionals	DC
Carrie Mansue	Rutgers Cooperative Extension	NJ
Vijay Nandula*	USDA-NIFA National Program Leader	KS
Alicyn Smart	Northeast Plant Diagnostic Network, University of Maine	ME
Margaret Smith*	Cornell University	NY
Andrea Szylyvian*	EPA Region 1, Pesticide Program	MA
Lisa Tewksbury	University of Rhode Island	RI
Julie Urban	The Pennsylvania State University	PA
Amber Vinchesi-Vahl	University of New Hampshire	NH
Simon Zebelo	University of Maryland Eastern Shore / IR-4	MD
*Steering Committee member		



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