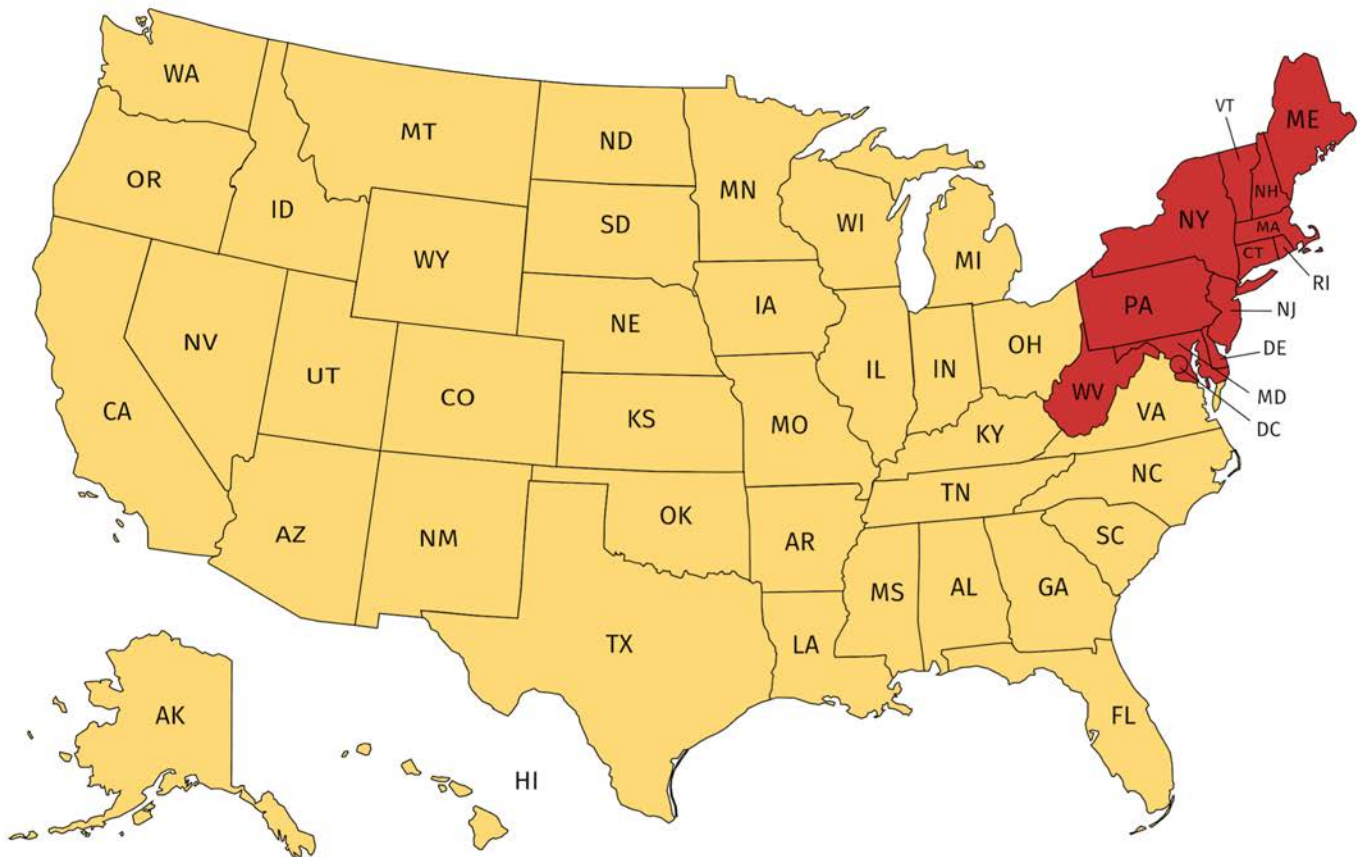


# NEERA 1604: Northeast Region Technical Committee on Integrated Pest Management



## 2019 Annual Meeting



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# **NEERA 1604 IPM Regional Meeting Agenda**

May 1, 2019 9:00AM-5:00PM

University of Maryland College Park

Stamp Student Union Grand Ballroom Lounge 1209

**9:00 AM** Welcome and introductions

**9:15 AM** Updates from NIFA Crop Protection and Pest Management, Herb Bolton

**9:50 AM** Updates from National IPM Coordinating Committee, Ann Hazelrigg (online)

**10:05 AM** *Break*

**10:15 AM** Updates from National Plant Diagnostic Network, Karen Rane

**10:40 AM** Sentinel apiary program, Dennis vanEngelsdorp

**11:00 AM** Visit to sentinel apiary, Andrew Garavito

**12:30 PM** *Lunch*

**1:15 PM** Updates from NEIPM Center, Deb Grantham

**1:30 PM** State reports

**3:00 PM** *Break*

**3:10 PM** Discuss Northeast crop profiles and pest management strategy plans, Deb Grantham

**4:00 PM** SLF update, Julie Urban and Heather Leach (online)

**4:30 PM** IPM “hot” topics, pollinator protection, ticks, pesticide issues

**5:00 PM** Break, optional self-guided tour of UMD arboretum gardens

**6:00 PM** *Dinner with NEIPM Center*

The Common

College Park Marriott

3501 University Blvd E, Hyattsville, MD 20783

## **NEERA1604: Northeast Region Technical Committee on Integrated Pest Management**

Duration: 10/01/2016 to 09/30/2021

### **Administrative Advisor(s):**

Jan P. Nyrop

Michael O'Neill

### **NIFA Representative(s):**

Herbert Bolton

Rubella S Goswami

### **Statement of Issues and Justification:**

In the northeastern United States, Integrated Pest Management (IPM) encompasses a wide range of activities that reduce environmental, health and economic risk in agriculture, schools and other rural, urban and suburban settings. The twelve states in the Northeast share many IPM needs because the pests, commodities and urban and suburban settings are similar in adjoining states. Therefore, IPM research and extension programs improve efficiency by collaborating. With global and regional demands to keep food production sustainable, safe, economic, and socially acceptable, IPM plays an integral role in both commercial agricultural operations and non-crop situations to achieve the goal of risk reduction.

All states in the Northeast region have research and extension programs that address integrated pest management (IPM). These involve management of pests in a wide range of crop production and non-crop situations. Managers need economically effective and environmentally sound pest management methods. Particularly in our heavily populated region—with constant interaction among farmers, other producers and managers, community and environmental advocates, and the public at large—we must also heed the requirement for socially acceptable methods.

The diversity of stakeholders, pest management settings, and pest management method associated with each setting challenges the limited resources of each land grant college in the region. With few exceptions, human and fiscal resources available for IPM programs have remained static or declined recently. Thus our IPM programs throughout the region face similar challenges and have similar needs during a period of scarce resources. Cooperative approaches that improve efficiency, avoid duplication of effort, pool resources, and build teamwork are required. Since 1996 NEERA-1604 (formerly NEERA-1004, NEREAP-IPM and NEREC-IPM) has served as the regional coordinating body that promotes and facilitates these cooperative approaches. Through the leadership and organization provided by NEERA-1604, the Northeast Region has become recognized as a national leader in effective multistate IPM programming.

The stakeholder need for regional IPM coordination and collaboration is well documented in the priorities of multiple working groups (WG):

- Brown Marmorated Stink Bug IPM WG  
<http://www.northeastipm.org/neipm/assets/File/Priorities/Priorities-BMSBIPMWG-2015.pdf>,
- Northern New England Pollinator Habitat WG  
[http://projects.ipmcenters.org/Northeastern/FundedProjects/ReportFiles/8675898\\_0000003.pdf](http://projects.ipmcenters.org/Northeastern/FundedProjects/ReportFiles/8675898_0000003.pdf)
- Cranberry Fruit Rot WG  
<https://www.northeastipm.org/neipm/assets/File/Priorities/Priorities-Cranberry-Fruit-Rot-WG-2015.pdf>
- New England Small Ruminant IPM WG  
<https://www.northeastipm.org/neipm/assets/File/New-England-Small-Ruminant-Survey-Results-2013.pdf>

The NEERA 1604 group, consisting of members with a broad base of knowledge and expertise, helps to prioritize IPM research and extension projects based on stakeholder needs in the region. With the ongoing changes in federally allocated monies that support agricultural research in Land Grant Universities (LGUs), multi-state cooperation plays a vital role in maintaining strong and viable IPM projects in the region. In addition, shrinking university resources have caused the elimination of faculty lines and programming in many states—thereby increasing the need for cooperation and collaboration across state lines. The NEERA 1604 group, while maintaining close ties with the NE IPM Center at the advisory and functional level, continues to play the distinctive role of spearheading IPM efforts of the region and supporting a regional IPM vision.

#### **Accomplishments:**

- Fostering the creation of numerous working groups that cross state lines and scientific disciplines to solve problems. A few examples include working groups on Spotted Wing Drosophila IPM, School IPM, The Scientific Coalition of Pest Exclusion, Livestock and Field Crop IPM, and Sustainable Landscapes. For a full listing see <http://www.northeastipm.org/working-groups/>.
- Increased understanding of the federal IPM funding process, and competitiveness for these funds.
- Workshops and communications organized to foster understanding and collaboration on Pest and Weather Forecasting systems.
- Collaboration across all twelve states to seek funding for an undergraduate IPM training and mentoring program. \*An AFRI proposal in 2015 was not funded, but participants are committed and continue to pursue funding.
- Development of a more comprehensive weed management approach for lima bean production.
- Multistate IPM for cucurbit virus in the Mid-Atlantic, with the University of Maryland as the lead.

- IPM for Brown Marmorated Stink Bug in peppers in the Mid-Atlantic: a collaboration among Rutgers University, University of Delaware, University of Maryland and Virginia Tech.

#### **NEERA 1604 Mission Statement:**

The Northeast Region Technical Committee on IPM is responsible for improving communication and cooperation throughout the region between research and extension personnel working on IPM projects. The committee, comprising extension and research representatives from LGUs in each cooperating state, the EPA and USDA, also plans and promotes the development of multistate IPM research and extension programs, provides oversight on the evaluation and impact of IPM programs, and serves in an advisory capacity to the Northeastern IPM Center.

#### **Objectives:**

- Promote, coordinate and facilitate cooperation, team building and multistate research and extension programs among the region's Land Grant University IPM programs.
- Develop and maintain the northeastern region's IPM communications network.
- Publicize the accomplishments of all IPM research and extension programs in the region.
- Maintain and develop communications and collaboration with national and regional IPM programs as well as other agencies and entities.
- Provide leadership to address evolving opportunities and challenges related to IPM in the region.
- Maintain collaboration with national IPM programming efforts and represent regional IPM interests in the national arena.
- Serve as the only forum where all the IPM Coordinators from the Northeast meet to discuss programs, issues, and stakeholder concerns directly.
- Serve in an advisory capacity to the Northeastern IPM Center.
- Report state IPM activities to regional representatives annually.
- Monitor and document the impact of emergent pests and the IPM strategies for managing them.

#### **Procedures and Activities:**

NEERA 1604 brings together a dedicated group of scientists, educators, specialists, regulators, and administrators, representing various universities, disciplines and governmental agencies that share a common interest in IPM. The synergism and energy created through the critical thoughts and interactive efforts of this group has created significant advances in IPM in the region. The procedures and activities of this group are listed below.

- NEERA 1604 includes the IPM Coordinator from every Land-Grant institution and research representatives from about half of the region's LGUs. Partner agencies EPA and SARE-Northeast participate actively. NEERA 1604 meets annually to discuss important issues, share experiences and plans, devise regional responses to national issues, and coordinate collaborative multi-state activities. Working groups confer throughout the year to develop action recommendations for NEERA 1604.

- Two NEERA 1604 officers (current chairperson and chairperson elect) serve on the National IPM Coordinating Committee (NIPMCC). Representatives of EPA and SARE-NE are active participants with NEERA 1604. The SARE-NE grants program technical review panel usually includes a representative from NEERA 1604.
- The past chair, current chair and chair elect of NEERA 1604 serve on the Advisory Council of the Northeastern IPM Center, and the current chair is also on the Steering Committee.

#### **Expected Outcomes and Impacts:**

- Region-wide collaboration to address IPM issues in commercial agriculture related to new and emerging pests.
- Region-wide collaboration to address IPM and pesticide exposure issues in schools. This includes utilization of IPM to help school managers successfully comply with laws existing in several Northeastern states that restrict or ban pesticide use on school grounds and athletic fields.
- Region-wide collaboration to address IPM issues in Community settings such as homes, parks, golf courses, office buildings and municipalities
- Collaboration with USDA/NRCS to ensure that IPM is a component of conservation payment programs, and is fully utilized in all northeastern states.
- Leadership in community and urban IPM programming.
- Development and sharing of publications and other educational material, such as fact sheets and apps.
- Success in leveraging funds in support of IPM programming from multiple sources including state agencies, commodity groups, and the private sector.

#### **Educational Plan:**

Both NEERA 1604 and the Northeastern IPM Center will continue to develop a sound educational plan related to the IPM needs of the region and will shift their emphases on a need basis. Recent educational efforts on brown marmorated stink bug, spotted wing drosophila, soybean rust, etc., have demonstrated the synergism obtained through their collaborations. Efforts will also be geared towards web-based technologies such as webinars to bring IPM to a new level of effectiveness and collaboration. The rapidly growing organic sector, the increasing interest in Community Supported Agriculture and the growing non-traditional farming operations managed by women and immigrant minority populations will require more educational efforts to meet the needs of such operations.

NEERA 1604 plays a crucial role in educating the public about new invasive pests as they emerge. Our members, individually and in collaboration, increase public knowledge of pest biology and IPM prevention and management strategies. Since community IPM goals were added to the National IPM Roadmap and several funding sources, the Northeast has been able to capitalize on the urban and suburban IPM needs and expertise in our region. Educational efforts will be planned along with the Northeastern IPM Center to develop enterprises in urban

areas where demands for fresh, locally and ecologically produced, high value products are on the rise.

Water protection, farm land preservation, sustainable forestry and enhancement of recreational areas all have IPM components. Underserved citizens are found in many places in the Northeast. They are mainly concentrated in the older parts of our cities. The buildings, schools, and neighborhoods in these parts of the cities suffer some of the most debilitating pest problems found in the region. Roaches, rats, and mice degrade the health and welfare of the residents who do not possess the means or knowledge to control them. IPM-based educational programs will continue to be developed in the region to meet their needs.

IPM requires knowledgeable practitioners, but is also enhanced by informed consumers. Consumers choosing IPM products are a powerful market incentive for practitioners to adopt more IPM in both agriculture and community settings. Consumer education from public outreach campaigns, social media, formal school instruction, and other avenues result in positive feedback to IPM practitioners. In addition, informed citizens will be more responsive in the political arena when issues of environmental protection and human health are considered.

**Organization/Governance:**

NEERA 1604 includes the IPM Coordinator from each of the region's twelve LGUs, and researchers from several LGUs. Representatives from EPA, SARE, the Northeastern Educational Research Association (NERA) and USDA-NIFA also participate. Working groups confer throughout the year to develop action recommendations for NEERA 1604. Two NEERA 1604 officers (current chairperson and chairperson elect) serve on the National IPM Committee. The past chair, current chair and chair elect of NEERA 1604 serve on the Advisory Council of the Northeastern IPM Center, and the current chair is also on the Steering Committee.

Duplication of effort will be minimized as a result of frequent communication, and synergistic collaboration will be optimized. Needs assessment, program development, implementation and evaluation for the region's IPM programs will all reflect inputs from a broad range of stakeholders including consumers, environmentalists, producers, managers and other IPM users. IPM programs in the region will be networked with national IPM leadership, with Land Grant IPM partners from other regions, with other public agencies, with appropriate non-governmental organizations, and with private sector partners. Results from and products of IPM programs in the region will be made available to the NE IPM Center to provide access for all interested parties. Accountability and evaluation information about IPM programs in the region will be easily attainable by all interested parties.



## **Connecticut IPM Program Report, April 2019**

### **Mary Concklin, IPM Program Coordinator**

The Connecticut IPM Program 2018 Annual Report, IPM factsheets, and other information are available on the UConn IPM website ([www.ipm.uconn.edu](http://www.ipm.uconn.edu)).

#### **Funding**

- The Connecticut IPM Program is funded in part by USDA (NIFA CPPM EIP, NIFA BFRDP, RMA, SCBG, SARE, FRTEP, AFRI ELI, APHIS), the Northeast IPM Center (NEIPMC), CT Department of Energy and Environmental Protection (CT DEEP), CT Department of Agriculture, and the University of Connecticut.

#### **Team Members**

- **University of Connecticut (UConn):** The IPM Program team includes Mary Concklin (IPM Program Coordinator), Donna Ellis (retired), Joan Allen (deceased August 2018), Candace Bartholomew, Jennifer Dacey, Shuresh Ghimire (joined July 2018), Miriah Kelly, Ana Legrand, Leanne Pundt, and Victoria Wallace in the Department of Plant Science & Landscape Architecture, and the Department of Extension.
- **Partners/Collaborators:** State and Federal agricultural and environmental/non-governmental agencies and organizations; State, New England, and Northeastern fruit, greenhouse, grounds keepers, nursery, turf, landscape, and vegetable associations; industry suppliers/dealers; regional universities; educators; schools and municipalities; individual growers, farmers, and producers; Master Gardeners; and the general public.

#### **Issue**

- Integrated Pest Management applies multiple tactics in a variety of settings through the selection of appropriate tools and the education of agricultural industry members and Connecticut citizens to provide sustainable, science-based approaches for the management of plant pests (insects, mites, diseases, wildlife, and weeds, including invasive plants). The UConn IPM Program incorporates all possible pest management strategies through knowledgeable decision-making, utilizing the most efficient landscape and on-farm resources, and integrating cultural and biological controls. Program objectives include maintaining the economic viability of agricultural and green industry businesses, enhancing and conserving environmental quality and natural resources, educating participants on the effective use of biological control agents, and educating pesticide users about the safe use and handling of pesticide products.

#### **Accomplishments**

- IPM Program team members conducted intensive on-site educational training for fruit and vegetable producers, garden center owners, greenhouse growers, nursery producers and retailers, and turf and landscape professionals. Growers and green industry professionals received information on the current status of and recommendations for important plant pests and training via pest messages, email alerts, webinars, newsletters, articles in national trade journals, management guides, websites, conferences, exhibits, and short courses.
- **Evaluations:** A formal IPM Collective Impact Assessment was conducted by IPM team member and evaluation specialist, Dr. M. Kelly. IPM programs were individually evaluated by the following methods: pre- and/or post program surveys and evaluations, needs assessment surveys and focus group meetings, testimonials, and unsolicited comments.

### **Connecticut IPM Program Outcomes**

- Fourteen CT grape growers participated in a new USDA funded project titled “iPiPE – CT Grape Component” involving weekly scouting and IPM training. Several participants indicated one of the most important aspects of this program was the IPM support and education.
- There were 133,956 sessions created by 111,510 users of the [IPM website during 2018](#), representing 173,143 page views. Visitors to the IPM website in 2018 increased 30% over the previous year.
- Integrated Pest Management education e-newsletters, pest alerts were delivered to:
  - 442 vegetable growers in Connecticut received 20 weekly vegetable pest updates from May-September.
  - 459 fruit growers and industry members received 77 fruit e-newsletters during the growing season.
  - 270 growers and allied members of the ornamental horticulture industry received 26 pest messages
- A total of 652 invasive plant activities in 30 Connecticut towns reached over 23,325 Connecticut citizens in 2018, including agency and municipal staff. A minimum of 9,414 hours of intensive invasive plant training sessions and management activities was provided, as well as technical educational outreach.
- Two intensive, team-taught short courses providing active training time of 1,101 hours were conducted for 46 individuals seeking initial state certification as commercial Ornamental and Turf or Golf Course Superintendent pesticide applicators.
- Eleven conferences and workshops were held covering fruits, vegetables, greenhouse, turf, landscape, invasive plants, and school IPM. UConn IPM Program members were integral in the following: Greenhouse Biological Control, Pest & Production Update for Greenhouse Crops, Invasive Plant Conference, UConn’s Vegetable & Small Fruit Conference, CT Pomological Society Annual Meeting, Small Fruit Scouting Primer, Tree fruit Scouting Primer, NE Greenhouse Conference & Expo, CT School IPM Workshop, 2018 UConn Turfgrass Field Day, and School Grounds Keepers Workshop
- During 2018, 772 plant samples were diagnosed, and management recommendations were provided to IPM Program participants and other stakeholders.

## Delaware State IPM Report

1 May 2019

NEERA, College Park, MD

Contributors: Alyssa Koehler, Brian Kunkel, Rose Ogutu, David Owens, Mark VanGessel

### **Current state of IPM staffing**

The University of Delaware hired a new plant pathologist, Dr. Alyssa Koehler, in October of 2018. Alyssa's program will focus on small grain, corn, and soybean diseases. Cooperative extension is in the process of hiring an open county agricultural agent position vacated in February 2019. Cooperative extension recently filled a new horticulture and natural resources agent position in Kent County. Farmers, crop consultants, and allied industry and service sectors need to be aware of new pest management tactics and developments that impact management strategies. To meet this need, IPM programming was delivered at several meetings:

- Mid-Atlantic Crop Management School – 246 participants comprised of crop consultants, extension, farmers, farm managers, agribusiness, soil conservationists, and state department of agriculture and environmental personnel. One third of survey responders indicated that adopting a new practice learned during 2017's Crop school helped implement reduced risk IPM tactics.

- Delaware AgWeek

- Carvel REC field day – 69 non-UD affiliated stakeholders, presentations by 17 UD and DSU personnel.

- Cover Crop Field Days – 2 locations

- 2018 Delaware Weed Field Day

- Herbicide Resistant Weeds Workshops – 6, half-day workshops were held in collaboration with University of Maryland and Virginia Tech extension focusing on management for herbicide resistant weeds such as palmer amaranth, common ragweed, and marehail, developing a weed management plan, and integrated management tactics.

- USDA-NRCS and Sussex Conservation District

- Beginning Farmer's Workshops

- Various agribusiness farmer meetings, including but not limited to, Providence Agriculture, Hudson Consulting, Trap Pond Agronomics, Scheeler Seed, and East Coast Seed.

Timely, in-field management updates are delivered through the Delaware Weekly Crop Update, a weekly circular that is sent to several hundred email recipients and in the mail to several subscribers. All IPM extension specialists in Delaware, and several from neighboring states, are regular contributors.

### **Status of EIPM grant**

Mr. Bill Cissel, funded through the state's EIP grant, left the University for private work in March 2019. His core duties through the EIP grant are being assumed by the ag entomology and weed science programs. Demonstration efforts documenting the impact of different cover crop termination dates and strategies are in place at six locations in the state. The insect trapping network has been expanded to include early season moth pest activity monitoring to help support cover crop termination extension efforts. The trapping network for corn earworm is used extensively to make insect management decisions on vegetable crop pest management, including 12 of 25 survey respondents. The information delivered has helped prevent yield loss over large acreages, reduce insecticide use, and result in increased profits, especially by sweet corn producers.

Benchmark data was collected from farmers regarding their incorporation of cover crops into their farm system as well as beginning farmers, field crop and forage crop producers as to their pest management challenges. YouTube scouting videos on cereal leaf beetle were created. Cereal leaf beetle phenology model validation work is in progress; project information was shared at three meetings. 2018 populations were extremely low, but 2019 populations are higher.

Ornamental IPM programming is spearheaded by Brian Kunkel. Education efforts are targeted to the landscape professional industry, nursery operators, and master gardeners. Two demonstration gardens have been installed for tree planting and focus on bark beetles, ash borer, and emerald ash borer. Two student interns were trained in IPM scouting, pruning, and proper mulching, and three factsheets are complete, soon to be printed and another is being prepared.

Urban Agriculture IPM programming implementation was delayed in 2018. Efforts are underway to provide management demonstrations to stakeholders. A session at AgWeek was devoted to protected structure IPM. Efforts are spearheaded by Dr. Rose Ogutu with Delaware State University. Workshops target small farmers, organic producers, and high tunnel producers. Needs addressed include weed prevention, companion plants, biological control and banker plant strategies, and other cultural tactics. The program worked closely with three high tunnel producers to implement IPM.

### **Core IPM focus areas 2019**

*Entomology.* Agricultural entomology programming is focusing on watermelon, sweet corn, soybean, and wheat pest management. Major issues include spider mite and cucumber beetle management, corn earworm management, *Dectes* stem borer in soybean, prophylactic insecticide use demonstrations, and small grain pest complexes (aphids, armyworms, and cereal leaf beetle). Ornamental IPM ongoing programs include evaluating non-neonicotinoid products for managing difficult pests including whitefly, root mealybug, citrus mealybug. IR-4 support for slugs and redheaded flea beetle management and feeding preferences of the redheaded flea beetle. A key issue that the ornamental IPM program is involved with is interfacing with DDA on the spotted lanternfly response and conducting field efficacy trials of non-neonicotinoids in PA and DE.

*Plant Pathology.* The field crops plant pathology program will conduct multiple pathogen surveys to assess disease levels across the state and build fungal culture collections for molecular identification of pathogens and future fungicide sensitivity assays. In soybean, nematode soil surveys also will be collected and sent for analysis to provide insight on the status of nematode populations in DE. The pathology program is part of the Soybean Cyst Nematode Coalition, a national initiative to educate producers about the breakdown in soybean host resistance to SCN occurring across the US. Field trials for fungicide efficacy data will be conducted in wheat (*Fusarium* head blight), soybean (foliar and stem pathogens), and corn (Grey leaf spot and Northern Corn Leaf Blight).

*Weed Science.* Chemical and non-chemical weed management of herbicide resistant weeds, including palmer amaranth, mares tail, and ragweed, is a major extension and research focus area for both field and vegetable crops. Partnerships include Virginia Tech and USDA-ARS researchers examining technologies for weed seed destruction or management. Utilizing cover crops for weed management is another core research and extension focus, and is a component of Delaware's EIPM program. Dicamba and allied trait management is an important research and extension focus area.

## **Maine State Report: NEERA meeting May 1, 2019**

Glen Koehler (Tree Fruit IPM, USDA Climate Hub) representing James Dill (IPM Coordinator), Charles Armstrong (Cranberry and Home & Garden IPM), Kerry Bernard (Pesticide Safety Education), Griffin Dill (Tick ID Lab), Clay Kirby (Insect Diagnostic Lab), Sean McAuley (Potato IPM), Alicyn Smart (Plant Disease Diagnostic Lab), Thomas Rounsville (DNA-PCR Lab).

### **APPLE**

A survey done in 2019 about IPM practices in the 2018 growing season found:

Portion of growers rating the Extension IPM Program Tree Fruit Newsletter as useful: 100%

Portion rating the Ag-Radar weather-based web pest and crop models as useful: 100%

Portion who benefitted from at least one IPM Program presentation or troubleshooting consultation (phone, email, field visit) in 2018: 100%.

Average reduction in pest damage attributed to Extension IPM Program information and services: 30%

Extrapolated statewide crop value of damage reduction: \$6.4 million

Average insecticide/miticide savings per acre attributed to Extension IPM Program: \$112

Extrapolated statewide value of insecticide/miticide savings: \$325,800

Average fungicide/bactericide savings per acre attributed to Extension IPM Program: \$93

Extrapolated statewide value of fungicide/bactericide savings: \$268,250

Average growth regulator/herbicide/praying costs/other savings per acre: \$93

Extrapolated statewide value of fungicide/bactericide savings: \$217,500

Maine Extension – Maine State Pomological Society Scouting Co-op

23 participating growers. Average of 2.4 blocks per grower per week.

15 weekly visits, average of 55 blocks per week

Total number of block reports: 825

2019 Developments: The Tree Fruit IPM Program, in cooperation with the UMaine Climate Change Institute and the UMaine Dept. of Industrial Cooperation is finalizing capabilities on the subscription based AgEye Weather to replace Skybit Inc. as a source of site-specific real-time hourly forecast and observed NOAA gridded weather reports and data files. Additional crop and pest models will be added to the Ag-Radar decision support system which in 2018 provided twice-daily updates of 30+ apple pest and crop management models per site for 38 sites in the Northeast.

In cooperation with the Extension Plant Disease Diagnostic Lab and the DNA-PCR Lab, the Tree Fruit IPM Program will offer DNA testing for fire blight in 2019.

A very simple and fast, but highly informative survey method started in 2018 was repeated in early 2019 to assess what specific IPM related practices apple growers actually used in 2018. The anonymous survey consists of 45 single line statements about such practices such as “Used monitoring traps for apple maggot fly” or “Did pre-season sprayer calibration with measurements and a written record”. Replies have been useful, encouraging in some respects, disappointing in others. It would be interesting to extend this approach to other Northeast states for comparative results.

## **POTATO**

The Potato IPM Program maintains 200 specialized insect traps, coordinates a statewide network of electronic weather stations, and surveys 100 potato fields on a weekly basis.

In 2017, the Potato IPM Program made over 1200 individual grower contacts and trained over 200 potato industry personnel at conferences and training sessions. Based on conference surveys, improved decision making resulting from training sessions equated to a savings of \$216,820. The economic impact of the Potato IPM Program's insect monitoring was \$8,834,260 in 2017, primarily due to late blight scouting.

## **SWEET CORN**

The Sweet Corn IPM Program reaches over half of Maine's commercial sweet corn growers managing over two thirds of the state's acreage, and has had an estimated \$725,000 annual impact. The post-season survey indicated that 93% of growers receiving information from the Sweet Corn IPM Program were able to decrease production costs as a result. Estimated insecticide savings are more than three applications per year on more than 3000 acres of sweet corn.

## **STRAWBERRY**

Extension IPM scouts monitor 8 farmer volunteer sites each growing season and the pest management recommendations are delivered to over 65 growers statewide through weekly newsletter, e-mail, and blog updates. Additionally, we have worked with growers to adopt alternative strategies such as pest resistant cultivars, biological controls and insect barriers. The year-end evaluation of growers found that 85% of growers modified their pest management practices as a result of the program and were able to reduce pesticide applications, some by as much as 50%. Most growers indicated an improvement in crop quality, and found that IPM has both reduced pesticide costs (up to \$100/acre) and improved crop profitability. The strawberry IPM program was recognized by the National Association of County Agricultural Agents as a national winner of the SARE Search for Excellence in Sustainable Agriculture Program.

## **CRANBERRY**

The Cranberry IPM Program monitors insect pests and provides online educational resources for growers. As a result, Maine cranberry growers have seen an industry wide increase in annual yield of approximately 20-30%. In 2017, an estimated 70% or \$69,300 worth of cranberry yield was saved from an outbreak of blackheaded fireworm and other emerging pests.

## **HOME & GARDEN/PUBLIC HEALTH/INVASIVE PESTS**

Outreach efforts of the Home & Garden IPM Program and the Tick Identification Program have significantly increased the number of direct contacts with the public regarding pest management options and the safe, judicious use of pesticides. Beginning in 2019, the free tick ID program is supplemented by PCR testing for presence of Lyme disease, babesiosis, and anaplasmosis at \$15 per tick, for Maine state residents only.

An informational tick website provides Maine a wide range of resources on tick biology, ecology, management, and personal protection. Additional public outreach through multiple public speaking engagements and media interviews has also helped increase public awareness.

Outreach has also continued on a number of home and garden pests including bed bugs, Japanese beetles, white grubs, and brown-tail moth. The area affected by brown-tail moth and its skin and respiratory irritating hairs has increased over the past two years. The Extension IPM program continues to cooperate with state and Maine Medical Center outreach and research efforts on pests of medical importance and potential and emerging invasive pest risks.

A new pesticide safety education training manuals is nearing completion for mosquitoes, ticks, and browntail moth.

## **OTHER IPM PROGRAM DEVELOPMENTS**

In July 2018, the IPM Program moved into the new \$12+ million UMaine Extension Diagnostic and Research Laboratory, along with the Veterinary Diagnostic Lab and the Aquatic Animal Health Lab.

Upon request by Maine IPM Coordinator James Dill, Senator Susan Collins has requested that the Federal IPM budget be protected from elimination, and a \$10 million increase in the budget. Senator Collins' interaction with USDA Secretary Perdue found that he has experience and a favorable opinion of IPM.

Several long time IPM Extension and research faculty have retired recently. Positions have been/are being refilled.

## **Maine input for discussion topics**

### **Spotted lanternfly (SLF)**

SLF has not been detected in Maine as of early 2019. We are distributing information generated by Penn State and Cornell to tree fruit and grape growers. If SLF is limited to plant hardiness zone 5, that would restrict to south coastal Maine for time being, though continued temperature increases have already altered Maine plant hardiness zone ratings.

**Pollinators:** The Maine Pesticide Safety Education Program recently offered two half-day workshops on pollinator protection and enhancement. The Maine Board of Pesticides Control hosted a pollinator protection stakeholder summit three years ago, and is considering another one in the coming year. The Ag-Radar system includes forecasts of honeybee foraging activity based on relationships between temperature, wind, sunlight and rain and the relative intensity of honey bee foraging.

**Ticks:** Discussed in IPM Program summary.

**Pesticides:** With regard to chlorpyrifos, chlorothalonil, and the neonicotinoid insecticides, the Maine IPM program will respond as needed to Federal regulatory decisions. Regarding glyphosate, UMaine lawyers, in reaction to the recent liability judgement in California, now require that a half-page disclaimer be used wherever glyphosate is mentioned.

**IPM and Invasive Species:** At the state level, Maine Dept. of Agriculture, Conservation, and Forestry oversees both IPM and Invasive species staff and programs. The UMaine Extension IPM Program cooperates with those efforts, including conducting USDA-APHIS-CAPS exotic pest surveys when visiting vegetable farms and orchards for IPM scouting.

## 2019 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, with ~32% of its 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. As the single largest commercial industry in MD, agricultural profitability and production must also be prioritized. MD produces a broad diversity of agricultural commodities, and our IPM programming targets pollinator health, fruit and vegetable crops, green industries, communities, and agronomic crops. Specific issues addressed include:

### *Pollinator health*

- Improving health of managed bees
- Increasing pollinator habitat

### *IPM in fruit and vegetable crops*

- Identifying *Colletotrichum* spp. causing anthracnose in VA, MD, PA to detect potential spread of a more serious species and improve anthracnose management
- Evaluating and improving the strawberry advisory system as a predictor of real-time disease incidence
- Improving management of late season bunch rots
- Developing a fungicide resistance testing service for grape production
- Improving spotted wing drosophila management in small fruit
- Developing BMPs for biostimulant use in vegetables
- Using cover crops for ecosystems services and weed management in vegetables

### *IPM in green industries*

- Increasing sustainability of nursery, greenhouse, and landscape management practices
- Developing biological control approaches for emerald ash borer
- Improving brown marmorated stink bug management

### *IPM in communities*

- Increasing homeowner adoption of IPM through Master Gardener programming

### *IPM in agronomic crops*

- Reducing insecticide use through better understanding of pest pressure and efficacy
- Monitoring for resistant to Bt traits using sentinel sweet corn plots (we coordinate trials throughout east coast)
- Determining *Dectes* stem borer pest status, phenology, and monitoring approaches
- Improving weed management, particularly for herbicide tolerant weeds

### *Invasive species response*

- Increasing citizen awareness of spotted lanternfly and boxwood blight issues
- Providing a tick identification service to better understand Asian longhorned tick distribution

**Response:** The Maryland project team conducts applied research to evaluate the efficacy of pest management practices and to develop novel sustainable tactics. Much of our work is performed in collaboration with stakeholders to better circumvent production constraints. We



also perform demonstrations on stakeholders' properties as well as at University facilities to encourage adoption of best management practices. We educate face-to-face at extension meetings, field days, workshops, train-the-trainer events, in-service trainings, and through booths at events. Numerous print and web-based newsletters, publications, announcements, and updates are provided in addition to media broadcasts, social media presence, online videos, and other approaches to disseminate timely research-based information.

## **Outputs and Impacts:**

### *Pollinator health*

- A national survey of honey bee pests and diseases has been funded annually since 2009 by the USDA Animal Plant Health Inspection Service (APHIS) and conducted in collaboration with the University of Maryland vanEngelsdorp Honey Bee Lab, USDA Agricultural Research Service (ARS) and State Apiary Specialists.
  - Over the past 9 years, this nation-wide survey has become the most comprehensive honey bee pest and health survey to date, and provides essential disease and pest load base line information.
  - [https://bip2.beeinformed.org/state\\_reports/](https://bip2.beeinformed.org/state_reports/)
- MiteCheck is a national effort to collect varroa mite infestation data and to visualize varroa infestations in honey bee colonies across North America and Canada. About 366 beekeepers have recently been reached in MD, with an additional 420 beekeepers at the regional and national level.
  - The percentage of beekeepers surveyed who did not use mite treatments has declined from 31% to 11% in MD.
- Since 2015, the Bee Informed Partnership has engaged over 200 beekeepers in responsible Varroa management via the Sentinel Apiary Program. The program consists of beekeepers participating in monthly monitoring of their colony and apiary health.
  - Results from this effort are public and can be viewed at: <https://bip2.beeinformed.org/hive-scales/public>
- Pollinator meadows established at 6 sites to be used for stakeholder education
  - Communicating with city council members and community volunteers to get approval for more meadow projects

### *IPM in fruit and vegetable crops*

- Participating in multiple multi-state projects to improve SWD management
- SWD management presentations provided to local, regional, national, and international audiences reaching 475 people
  - Evaluation surveys at 10 events from 2015-2017, indicate more than half of the 50 respondents intended to (26%) or would consider (28%) changing their SWD management methods to align with recommendations (totaling 54%).
- Face-to-face extension activities reached 1,103 stakeholders interested in vegetable production
  - 75 vegetable growers know how to use biostimulants in their operations as well as use pest management strategies to manage insect and disease pests.

- 52 vegetable growers that participated in advanced pest management training were given 2019 Vegetable Production Recommendation manuals
- Survey results from 157 growers and consultants demonstrate that the outreach, trainings, presentations, on-farm trials helped growers by: Alerting them (80%) to new problems; 53% were provided with improved economic impact; 67% scouted more than before; 34% said it prevented yield loss; 58% said helped them implement better IPM programs.
- 13 vegetable growers' farms were visited and on-farm trials were set up in the spring and summer. Trials consisted of small to large areas of the farm dedicated to answer a question the grower had.
- 18 small or underserved growers from Maryland were either trained or had demonstration or research trials set up on their farms.
  - Half of the 18 growers have changed either how they control a particular pest on their farm or have changed how they manage their cover crops to improve nutrient management.
- 1 peer reviewed publication, and 2 extension publications on vegetable IPM topics
- 28 vegetable IPM articles reaching 6,300 growers, consultants, and extension specialists
- All clover species have now been added to the state cover crop list. This allows farmers to receive cost share funds for planting clover cover crops as part of their grass-legume winter cover crop mix.

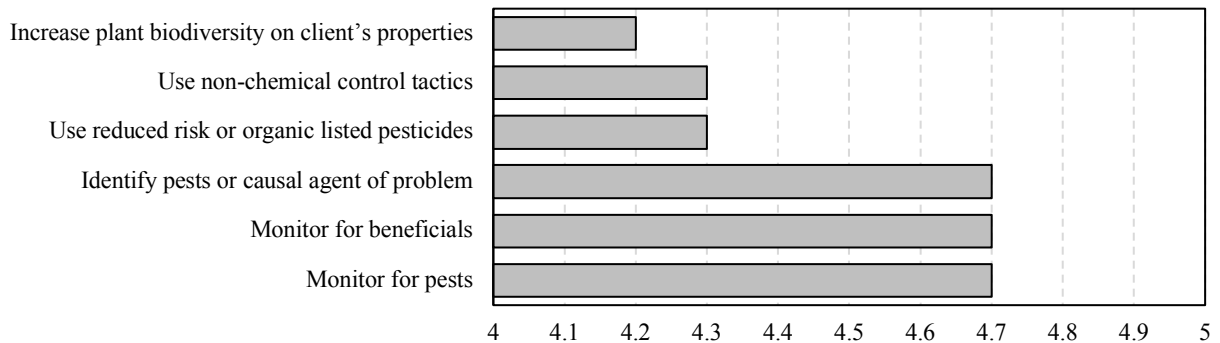
*IPM in green industries*

- Electronic IPM Pest provides multi-disciplinary real-time pest management information from March-October and reaches over 3,130 weekly subscribers
  - Subscribers share the report with more than 10,300 colleagues
  - Economic impacts of IPM report (453 businesses reporting):

	<b>Range</b>
Annual savings related to information in IPM report	\$72,000 – \$171,000
Annual increased earnings related to information in IPM report	\$106,000 – \$218,000
Total savings and increased earnings over this 5-year period	\$890,000 – \$1,945,000

- Online pest prediction calendar (2016 to present) uses degree days and plant phenological indicators to predict pest activity
  - 2,534 views in 2016; 2,714 views in 2017
- Advanced landscape IPM short course (30-40 hr program) has trained 634 people since 2005 from more than 20 state and 3 countries

- Responses of how likely attendees are to make the following changes in practice (1 = not likely, 5 = very likely):



- Developed and distributed bilingual (Spanish and English) pest landscape pest identification materials
- 5-day IPM scout trainings for greenhouse and nursery professionals have been conducted since 2017 and 50 professionals have been trained
  - 95% of participants evaluate the experience as “highly likely” to improve their diagnostic skills

#### *IPM in communities*

- Provide basic and advanced IPM trainings for Master Gardeners, including online modules and multiple in-person meetings
- Added new content to Home and Garden Information Center including 3 new lawn care pages
- Pre- and post-tests of Master Gardeners at Ecological IPM short courses indicate respondents (87) were 3x more able to identify pests and beneficials, 2x better able to select reduced risk and organic alternatives to manage pests, and surveys also indicate a 48% reduction in the use of pesticides and 45% reduction in fertilizer applications
- Maryland Grows blog posts on IPM topics- recent example: <https://marylandgrows.umd.edu/2019/04/01/boxwood-blight-in-maryland/>
  - Blog had 87,719 views in 2018 and currently has 445 followers by email and Wordpress subscriptions. Blog posts are re-posted on Facebook where we have 3,494 followers.

#### *IPM in agronomic crops*

- Monthly issues of Agronomy News (reaches ~3,000 extension specialists, grain producers, and other stakeholders) from April to October
- Surveys of >3,200 agronomy winter meeting participants conducted from 2012-2016 indicate:
  - \$16.23-\$25.32 increases in per acre profitability
  - 6.5%-9.5% increases in per acre yield
- 5 peer-reviewed publications covering grain IPM topics

- Presentations on insect pest management to 851 people
  - 2 yrs of evaluations (176 respondents across 5 events) indicate that 84% find information to be of benefit and 55% plan to change their practices
- Coordinated Bt resistance monitoring trials occurred at 16 locations in 8 states
- In conjunction with DE and VA, conducted 6 herbicide resistant weed workshops

*Invasive species response*

- Developed and distributed promotional materials for spotted lanternfly as well as ID cards for spotted lanternfly and boxwood blight
- Received 42 tick samples (since fall 2018) and identified ~100 ticks from these samples

## UMass EIP Project Report-NEERA Annual Regional Meeting May 2019

**Background.** Massachusetts is the 3rd most densely populated state; MA farm land is very valuable and often sought after for development. Farmers steward over 523,500 acres, >10% of the MA land base. There are 7,755 farms (of which 2,651 are vegetable, berry, and fruit farms) in MA. The total number of farms has been steady since 2007, however the number of vegetable farms increased by more than 400 (28%) since 2007. Averaging 68 A, 95% of MA farms easily fit the USDA definition of small farms, bringing in less than \$64,000 annually. MA farmers are committed to being efficient business owners and effective pest managers, optimizing the output of their small-scale specialty crop farms to meet consumer demands. MA farms generate over \$490M in total sales per year with 47% from sales of specialty crops such as apples, strawberries, and cucurbits. MA has almost 300 farmers' markets and ranks 1st nationally by percentage of farms with Community Supported Agriculture (CSA).

### **Goal 1: Improve IPM Practices and Strategies for Emerging and Established Pests**

- **Emerging Pests that Affect Multiple Specialty Crops.** UMass Fruit Team members coordinated and maintained monitoring networks for brown marmorated stink bug (BMSB), spotted-wing *Drosophila* (SWD), winter moth (WM) and scale. Findings were shared with the UMass iPIPE project (Garofalo and Clements).
- **Advanced Apple IPM.** Five weather station sites are established in southern New England established for the purpose of validating apple scab predictive models used in Decision Support Systems (DSS). Three Mentor Farms in MA worked with team members to increase their use of cultural controls and reduced-risk pesticides for apple scab and summer diseases. The same growers received additional training on fire blight prediction and management.
- **Brassica IPM.** The 2018-2019 issue of the New England Vegetable Management Guide was published in print and on-line, with several project personnel serving as Editor or Contributor.
- **Efficacy of Organic Pesticides.** 2 presentations given.

### **Goal 2A: Increase IPM Implementation and Promote Whole-Farm Sustainability through Outreach and Training Activities**

- **Training scouts and IPM implementation on Mentor Farms.** We hosted our annual Advisory Group meeting for the EIP grant. Growers who had previously participated in our program as Mentor Farmers shared their experiences to enhance recruitment of new Mentor Farmers for our new grant. EIP Team members (Lass and Morzuch) gave a presentation on IPM Decision Making and Business Management. In Spring 2018, IPM planning sessions were conducted at all Mentor Farms. Farm visits started in April. EIP Economists participated in planning interviews to provide guidance for business and/or economic goals.
- **Provide timely and accurate specialty crop disease/pest diagnostics.** Apple scab outbreak consultation was conducted at Mountain Orchard, Granville, MA on 5 acres of 'MacIntosh' apples. Sept 2017. Infestations of cranberry scale were confirmed at two different locations in mid-late April 2018.

- **Conduct Workshops and Training.** More than 20 presentations were given during the reporting period to support the EIP Project.
- **Bridge Language Barriers.** We have generated a draft survey to be used as a needs assessment that will guide our future outreach efforts and development of resources for farmers to overcome language barriers on the farm. This assessment tool will be sent out to growers once the team has had a chance to review the survey questions.
- **Promote Commonwealth Quality Program (CQP).** Sandler and Sylvia have worked with Botelho and other MDAR staff to create an audit package for cranberries destined for the fresh market. A feedback session with stakeholders was held May 2018 (11 attending). A launch of the cranberry program was planned for Summer 2018 but has not yet been released.

### **Goal 2B: Increase IPM Implementation and Promote Whole-Farm Sustainability through Demonstrating Effective Technological Strategies**

- **Digital Recordkeeping.** Currently growers can log in and access their plans and reports. Work is ongoing to improve this interface.
- **Optimizing Technology Utilization on Specialty Crop Farms.** We met with Skycision, a drone-enabled software company. A flight demonstration was performed on-site at the UMass Cranberry Station and a workshop was conducted (by Skycision personnel) on the applicability and adaptability of UAS for specialty crops.
- **Using Integrated Pest Information Platform for Extension and Education (iPiPE).** Two undergraduate interns have been hired as result of this project (see Training section). They will work in collaboration with EIP fruit team members to provide additional scouting and trap monitoring at all sites currently participating with the fruit program.
- **Weather Stations and Sensors.** We coordinated a network of 26 RainWise and Onset weather stations. Data were checked weekly and equipment was repaired as needed. Communications with growers about stations and data were accompanied with advice and questions about IPM and decision support systems (DSS). The EIP project finances the link between these 26 stations plus 20 more airport weather stations and New York State NEWA system.

### **Goal 3: Promote IPM Adoption by Improving and Expanding Skill Capacity and Evaluating Progress**

- **Business Management and IPM Decision Making.** Lass and Morzuch met with several entering Mentor farmers to provide guidance on business goal planning. The Team reached a consensus to explore the development of an enterprise budget for one vegetable, one small/tree fruit and one cranberry farm for the project.
- **Weed Management.** As soon as weeds emerged, cataloging of persistent weeds on Partner Farms began. A weed management workshop for organic vegetable farmers was held July 2018.
- **Assessing Change in Behavior and Condition from IPM Extension Efforts.** None to report at this writing.

University of New Hampshire's Cooperative Extension (UNHCE) IPM Team: Alan Eaton, George Hamilton, Cheryl Smith, Rachel Maccini & Anna Wallingford

**New Hampshire's IPM Program has three target audiences:**

- 1) **Fruit, vegetable, and greenhouse industries** receive the majority of our program's attention. UNHCE addresses a diversity of situations through one-on-one interactions, grower meetings & workshops, plant diagnostic center & arthropod pest identification services, sprayer calibration support & education, contribution to New England's pest management guides, a weekly-recorded telephone message, and regular email alerts.

*Apple IPM:* Orchardists use UNHCE services and UNH-supported weather monitoring tools to manage pest insects, mites, and plant diseases using the most economically and environmentally sound practices possible. Key pests are apple scab, fireblight, plum curculio, and apple maggot. Annual apple evaluations conducted for more than 25 years in the state find pest injury to fruit at steady levels. Damage due to wildlife is a growing concern, which has required facilitation of meetings with apple growers, state agencies, and other stakeholders by members of UNHCE. Concerns regarding the loss of chlorpyrifos, pollinator health, and increasing numbers of brown marmorated stink bug (detected by our regional monitoring network) are shaping the future goals of UNHCE's Apple IPM program.

*Small Fruit IPM:* Cultural management tactics for managing spotted wing drosophila (SWD) are emphasized at small fruit grower meetings and pruning workshops. Online surveys conducted in 2014 and 2015 found that more growers were pruning raspberry and blueberry, practicing better sanitation practices, and the majority self-reported decreases in SWD infestation.

*Vegetable IPM:* UNHCE maintains a regional trapping network for several key and emerging pest insects for our largest vegetable commodities in the state. For example:

Sweet corn pests, including European corn borer, corn earworm, fall armyworm, and western bean cutworm are monitored at 20+ farms annually. Weekly trap numbers shared with participating farmers and posted online by town. In 2017, participating growers reduced chemical pesticide applications to sweet corn by an average of 2.77 sprays and improved yield (decreased cull rate) by roughly 11% in 2016. Savings on pesticide and labor plus improved yield increased annual income by \$236, 096.

Squash vine borer, key pest of pumpkin/squash, are monitored at 15+ farms annually. Weekly trap numbers shared with participating farmers and posted online by town. In 2017, participating growers reduced chemical pesticide applications to squash/pumpkin crops by an average of 2.77 sprays with no change in plant losses due to squash vine borer in 2016. This resulted in an annual savings on pesticide and labor of \$33, 883.



## Extension

*Greenhouse IPM:* Survey results conducted during greenhouse IPM workshops in ME, NH, VT found a growing trend on reliance on biological controls compared to previous workshops, which will shape our educational efforts in protected culture. Cyclamen mite is a growing concern in many ornamental crops as well as strawberry.

- 2) **Public Health IPM:** anyone residing or visiting NH is our target audience. New Hampshire has the highest incidence of Lyme disease in the US, and ranks in the top ten states in EEE, Babesiosis and Anaplasmosis.

Members of UNHCE participate in public outreach education, including public lectures, interviews with print, broadcast & digital media, providing displays & handouts at public events, in order to promote awareness of arthropod-vectored diseases and how to reduce risk of exposure by avoiding high risk areas and by using repellents.

Dr. Eaton served on NH's arbovirus task force, took part in preparing NH's tick-bourne disease management plan, and has supported regional monitoring & research objectives by sampling tick populations, submitting ticks for pathogen testing.

- 3) **Community IPM:** backyard gardeners and urban residents are key audiences, but any resident of the state is a potential clientele member.

We extend many of our efforts to members of the general public who implement IPM in their homes or home gardens. Plant diagnostic and insect identification services annually process 200+ samples from the public. Extension staff and master gardener volunteers at The Education Center annually answer 2,200+ pest-related questions from the public via a toll-free telephone number and email. The work of the diagnostic center and these public interactions have also contributed to various collections and research efforts, including 200+ species of bees, winter tick, first record of western bean cutworm. A member of the public found the first record of long-horned tick in the state, identified with the help of UNHCE.

### Current & Future Programs

- Expand monitoring network for BMSB
- Quantify impact of cultural control education for SWD
- Provide education on chlorpyrifos alternatives, monitoring & research support
- Provide education on biocontrol in protected culture, monitoring & research support
- Develop an Integrated Pest & Pollinator Management (IPPM) plant in collaboration with the NRCS & Xerces society
- Distribute insect repellent kits for all outdoor extension activities



# New York State IPM Report, NEERA 1604 Meeting, May 1, 2019

prepared by Jennifer Grant and Elizabeth Lamb, NYSIPM Program

## SITUATION

New Yorkers are exposed to risks from pests and methods used to control them.

## RESPONSE

The NYS IPM Program is reducing environmental, health and economic risk by teaching, demonstrating and researching IPM practices. We program in agricultural crops—fruits, vegetables, ornamentals, field crops and livestock; and community settings—schools, homes, municipalities, parks, and golf courses.

## RESULTS/IMPACT

**Funding:** In 2018 we received state funds for Community IPM, \$550,000; Agricultural IPM, \$1,000,000; and Tick IPM, \$156,000. Also Federal USDA-NIFA CPPM-EIP funds = \$285,000.

**People:** In 2017-2018, hired two Coordinators: NEWA and Field Crops/Livestock; and two Specialists: Biocontrol and Weed IPM.

**2017-2018 Annual Report** in calendar format, featuring NYSIPM staff and projects.

[nysipm.cornell.edu/about/our-annual-report](https://nysipm.cornell.edu/about/our-annual-report)

**Annual IPM Conference**—In 2018, the topic was *Integrated Management of Ticks and Mosquitoes*.

Attended by over 90 scientists, educators, regulators, master gardeners, and policy makers.

**Mini-grants program:** In 2018 we funded 13 mini-grants in Community IPM to CALS faculty and staff, CCE, and other partners.

**Pollinators:** We support implementation of NY's Pollinator Protection Plan; conducted research on establishment of habitat for beneficials <https://tinyurl.com/y6ck7w5v>; and helped produce pesticide decision guides <https://pollinator.cals.cornell.edu/resources/grower-resources/>

**Ticks:** We created the *Don't get Ticked NY* campaign that includes 13 infographic posters, a tick ID card, and kits for tick removal and education. <https://nysipm.cornell.edu/whats-bugging-you/ticks/> We also surveyed tick and disease distribution in three areas of the state.

**NEWA (Network for Environment and Weather Applications)** <http://newa.cornell.edu>

is a system of 643 physical weather stations located in 13 member states that use real time weather data in 43 different models, tools, and resources to provide agricultural insect and disease risk estimates. A survey last year showed that the NEWA users saved an average of \$4,329/yr. annually by reducing pesticide sprays and \$33,048 by preventing crop loss. Their average per acre savings as a direct result of using NEWA was \$2,060 annually.

## Resources produced

*Profiles of Active Ingredients Eligible for Minimum Risk Pesticide Use*—Profiles on each of the EPA's 25(b)-eligible exempt active ingredients, that include a summary of uses, hazards, and efficacy.

[nysipm.cornell.edu/environment/active-ingredients-eligible-minimum-risk-pesticide-use](https://nysipm.cornell.edu/environment/active-ingredients-eligible-minimum-risk-pesticide-use)

*How to Get Bed Bugs Out of Your Belongings*—Comprehensive 68-page document on handling bed bug infested items. <https://ecommons.cornell.edu/handle/1813/55760>

*IPM Image Gallery:* >4,000 images with links to management [flickr.com/photos/99758165@N06/](https://www.flickr.com/photos/99758165@N06/)

*IPM for Foliar Diseases of Soybeans* and *IPM for Insect Pests of Field Corn*—online courses with

pesticide recertification credits [pmpcourses.cce.cornell.edu/catalog?pagename=All-Items](https://pmpcourses.cce.cornell.edu/catalog?pagename=All-Items)

Pesticide decision-making guides to protect pollinators in tree fruit; and in landscapes, ornamentals and turf. <https://pollinator.cals.cornell.edu/resources/grower-resources/>

IPM Guidelines for SWD in Blueberry; Raspberry and Blackberry on Northeastern IPM Center website.

<https://www.northeastipm.org/working-groups/spotted-wing-drosophila/>

Elements of IPM: Field Corn, Soybeans, Alfalfa, Winter Wheat

[nysipm.cornell.edu/resources/publications/ipm-elements/](https://nysipm.cornell.edu/resources/publications/ipm-elements/)

Disease and insect resistant woody ornamental species and cultivars - <https://tinyurl.com/y6emg5f3>

## Highlights by Commodity

### Community:

- Authored *The ABCs of School and Childcare Pest Management Blog* [blogs.cornell.edu/schoolchildcareipm/](http://blogs.cornell.edu/schoolchildcareipm/) and **BMPs for school IPM in the Northeast** [northeastipm.org/bmps-for-school-ipm/](http://northeastipm.org/bmps-for-school-ipm/)
- Taught a **Structural IPM Short Course** for pest management professionals, including a large teaching collection of insect specimens and a manual developed for the course.
- Researched **distribution and movements of rats** on the perimeter of food plant facilities.
- Updating *Biological Control: A Guide to Natural Enemies of North America* website
- Co-led the **Scientific Coalition on Pest Exclusion (SCOPE)**—a working group focused on the scientific verification and promotion of exclusion as a primary tool in IPM in buildings.
- Continued long-term partnership with 29 NYS Park Golf Courses on **reduced chemical golf course management**.

### Vegetables

- **Organic efficacy trials:** - tested organically-approved pesticides in collaboration with Cornell faculty: [nysipm.cornell.edu/agriculture/vegetables/organic-resources-vegetables](http://nysipm.cornell.edu/agriculture/vegetables/organic-resources-vegetables).
- **Sweet corn pheromone trap network** (<http://sweetcorn.nysipm.cornell.edu>)—weekly summaries of lepidopteran trap catches and recommendations for scouting and thresholds.
- NYSIPM Weed IPM Specialist **tested and demonstrated cultivation** in sweet corn, snap beans, and beets. See the video: <https://www.youtube.com/watch?v=hYyToq4qrZ0>
- Collaborated with PMEP to create a full set of **organic vegetable guidelines** produced in conjunction with the Cornell **Integrated Crop and Pest Management Guidelines** for Commercial Vegetable Production—with IPM practices harmonized for both guides.

### Fruit & Hops

- **Spotted Lanternfly (SLF):** As part of NY's Incident Command Structure, created numerous identification and awareness resources; and surveyed the preferred host, *Ailanthus altissima*, tree of heaven [nysipm.cornell.edu/environment/invasive-species-exotic-pests/spotted-lanternfly/](http://nysipm.cornell.edu/environment/invasive-species-exotic-pests/spotted-lanternfly/)
- **Spotted wing drosophila (SWD):** Statewide trapping network; testing hummingbirds as biocontrols in raspberries; 51 grower alert blog posts; SWD NYS distribution map generated [www.eddmaps.org/swd/](http://www.eddmaps.org/swd/)
- Evaluated impact of **grape rootworm** on vine size, alternative materials and timings for management and biological control for grape rootworm were tested in 10 Lake Erie region vineyards.
- Developed a **Sustainable Hops IPM Program from Greenhouse to Harvest**

### Ornamentals

- Established a **Christmas tree planting** for research and demonstration at Cornell AgriTech, and adjacent **beneficial insect and pollinator habitat demonstration plots**
- Provided **hands-on IPM training in greenhouse and high tunnel vegetable production** for growers and CCE educators.

### Livestock and Field Crops

- **Weekly Field Crop Pest Report blog:** 22 issues in 2018 reaching several thousand producers and educators via direct subscription and a variety of traditional and social media <http://nysipm.cornell.edu/fieldcrops/tag/pestrpt/default.asp>
- **Bio-based bird repellent** (Avipel) seed treatment tested on corn and shown effective under high bird pressure
- **Western Bean Cutworm Pheromone trapping network** since 2010 has documented high populations and widespread occurrence across NY. Economic damage has begun.

2019 Pennsylvania IPM Program (PAIPM) report to NEERA  
**Ed Rajotte**, IPM Coordinator

PAIPM delivers both urban and agricultural IPM education. The programs listed below are at least partially funded by USDA NIFA IPM Extension funds

Urban- **Dion Lerman**, Philadelphia

- 41 trainings reaching over 1300 participants
- 35 Home Assessments (IPM for CR & Mice) for CAPP
- 12 homes treated with Aprehend
- 2 School walk-throughs
- Planned and conducted Rodent Academy with Dr. Bobby Corrigan for School District of Philadelphia
- Staff training for:
  - Community Asthma Prevention Program (CAPP), Children's Hospital of Philadelphia (CHOP)
  - Lead & Healthy Homes Program, Philadelphia Dept. of Public Health (PDPH)
  - Healthy Homes Program, National Nurse-led Care Consortium (NNCC)
  - Allentown Health Bureau
  - Philadelphia Veteran's Multi-Service Center
- Hoarding Webinar for Healthy Housing Solutions/HUD – presented live 4 times.
- Outreach events (n=6(?)) in partnership with the Franklin Institute
- Presented at the 9<sup>th</sup> International IPM Symposium, Baltimore, MD, March
- Presented at the 10<sup>th</sup> Asthma Disparity Conference, CAPP, Philadelphia, October
- Attended Global Bed Bug Summit, Denver CO, November
- Working with Managed Care Organizations (MCO's) to implement new Medicaid benefit of IPM services

School and Childcare (curriculum/facilities) Related **Michelle Niedermeier**, Philadelphia

- IPM for PA Schools Manual – New revision out in a few weeks
- PA Green & Healthy Schools Partnership (executive committee)
- Health Services Advisory Council Meetings:
  - Health Federation of Philadelphia Early Head Start
  - CHOP Early Head Start
  - CDI Head Start
- School District of Philadelphia – Green Futures, Healthy Schools
- Summer Sustainability Boot Camp
- Healthy Schools Coalition – conference call
- Attended the Pennsylvania Association of Environmental Educators 2-day conference
- Met with PDE and PDEP to discuss/reboot the K-12 Academic State E&E Standards (IPM)

### K-12 Youth Programming

- Central High School Earth Day – “pests, parasites, predators, and pollinators” interactive discussion/lecture (160 HS students)
- The Philadelphia School – “mouthpart madness” activity (25 preschoolers)

### Asthma Related

- CHOP CAPP
  - WePACC meetings
  - 10th Annual Fighting Asthma Disparities Summit
    - Planning Committee Meeting
    - Event
- Pennsylvania Asthma Partnership – Statewide meeting (1 = 30 people), regional conference calls (5 = 80 people)

### Climate Change Related

- Climate and Urban Systems Partnership (CUSP) with the Franklin Institute - meetings, and outreach events
- Philadelphia Department of Public Health, Climate Change and Health Advisory Group meetings

### Urban/Ag Related

- Rodale Stroud Water Outreach conference call meeting
- Lead and nutrition event conference call discussion with ATSDR
- “Growing a Sustainable City” workshop

Philadelphians Against Bed Bugs (PhABB) - meetings and outreach events. Bed bug legislation pending before Phila City Council.

### Arthropod disease vectors

- PDP meeting (Erika Machtinger) – insect vectors of disease to humans and animals

### Public Health

- UPenn, MPH program talk (Pests, Pesticides & Health)

### Agronomic- John Tooker and agronomy team.

In 2018, we continued to trap for black cutworm. We had 23 traps in 17 counties, monitoring by 12 extension educator and the students of one high school agricultural educator. We detected only one significant flight of black cutworm, which was in Potter County. Most weeks of our 6 week trapping effort, I wrote newsletter articles updating readers on the status of our trapping and what the results mean. Our Field Crop Newsletter reaching about 7000 folks in the agricultural community.

We also continued our ongoing Soybean Sentinel Plot Program, which has been funded by the PA Soybean Promotion Board for the last seven years. The goal of this projects is to track insect and disease pest populations in typical soybean fields around the state and share this information with growers. Fourteen extension educators around PA are participating in this effort, tracking populations in 26 fields in 20 counties. In 2018, as in past years, our scouting efforts have discovered a fairly narrow range of insects and only a few diseases. Generally, pest populations in PA soybean fields were low, as

was the case for the six previous years, and this is an important message for growers to hear: pest populations are not pervasive and always threatening soybean yield. In fact, in many locations and in most years, pest populations do not develop and thus pesticide use should provide no advantage.

I also continue to provide information to the agricultural community on the questionable value of neonicotinoid seed treatments. Our research continues to show that these ubiquitous insecticides provide little to no advantage, but leave fields more vulnerable to pest outbreaks because they host fewer natural enemies. Our research is showing that fields planted with neonic-coated seeds tend to have more slugs, which are very problematic in PA no-till fields, and fewer collembolans, which limits decomposition of crop and cover crop residue in crop fields.

#### Integrated Pest and Pollinator Management- **David Biddinger, Margarita Lopez-Urbe**

- Integrated Pest and Pollinator Management (IPPM) being adopted.
- Research results moved into grower recommendations.
- Evidence for insecticidal and fungicidal toxicity to bees

#### Spotted Lanternfly- **Heather Leach, Julie Urban**

- English and Spanish fact sheets <https://extension.psu.edu/spotted-lanternfly>
- SLF has an established population in 4 states (PA, NJ, DE, VA) and has been detected in an additional 4 states (NY, MA, CT, MD) since its first detection in 2014
- Significant yield losses in grape have been reported (up to 90%, including death of vines) and growers have increased their annual number of insecticide applications by 10 with associated increase in costs (\$54/acre in 2016, \$147/acre in 2018).
- SLF is under a state quarantine in PA, NJ, and DE, with regulations on businesses to prevent further spread of SLF. For some businesses (e.g. nurseries), this has added enormous production costs to inspect and clean all material before shipping. This has also resulted in loss of customers from some states who don't want to be responsible for the accidental spread of SLF.
- Julie Urban leading USDA-SCRI CAPS proposal to request funding for research on spotted lanternfly for short-term and long-term management solutions. USDA-ARS, Virginia Tech, University of Delaware, University of Rhode Island, Temple University, Cornell University/NEIPMC, and Rutgers University are all partners on this proposal.
- 2018 research highlights from PSU:
  - Movement, flight, and behavior of spotted lanternfly (Tom Baker et al., <https://link.springer.com/article/10.1007/s10905-019-09708-x>)
  - Insecticide trials for residual activity on tree fruit and grapes for SLF nymphs and adults (David Biddinger et al., <https://extension.psu.edu/updated-insecticide-recommendations-for-spotted-lanternfly-on-grape>)
  - Ovicides for control of SLF egg masses (Greg Krawczyk)
  - Development of a degree-day model for egg hatch using field and lab data (Erica Smyers, Julie Urban, Dennis Calvin)
  - Evaluation of insecticides for control of SLF on ornamental trees (Charlie Mason, Julie Urban)
  - Methods to sustain SLF in colony (Julie Urban et al.)

## Rhode Island IPM Program Report, April 2019

Heather Faubert and Lisa Tewksbury, Program Co-Coordinators

URI Dept. of Plant Science and Entomology

**Team:** Lisa Tewksbury, Heather Faubert

### **Accomplishments:**

- URI received a permit to release *Hypena opulenta*, a biological control agent of swallow-worts in August, 2017. Releases were made in Massachusetts and Rhode Island in 2018. There is a large interest in this project with stakeholders in RI and throughout the Northeast. We are collaborating with biocontrol researchers and land managers in RI, MA, CT, NY, ME, MI, and NJ. Many of these collaborators will be collecting data to evaluate the effectiveness of this biocontrol agent.
- The lily leaf beetle biological project collaborated with New York, Connecticut, Washington, and Vermont to release lily leaf beetle parasitoids. The lily leaf beetle has been moving into new states and there is interest in facilitating the movement of parasitoids to help manage this pest. We continue to receive positive anecdotal information from areas where parasitoids were released many years ago that lily leaf beetle populations are still at low levels.
- The biological control of Phragmites project has progressed to the point of submitting a petition for release for two biological control agents; both moth species. Petition was just approved (April 2019) and the Environmental Assessment is being written.
- Mile-a-minute is a pervasive problem in RI. URI released 5,000 *Rhinoncomimus latipes* weevils, a biological control agent of Mile-a-minute in RI in 2018. We also released 2,100 *Larinus obtusus* in RI, which is a biological control agent of knapweed. In both cases it is still a bit early to identify if the programs are successful.
- Landscapers and plant owner had been spraying landscapes for many years to control winter moth caterpillars and then gypsy moths starting in 2015. We educated growers, landscapers, and the public about the demise of gypsy moths and the reduced population of winter moths. We spread this message at Landscape meetings, fruit grower meetings, Master Gardener presentations, RI Nursery and Landscape Association newsletters, and email messages to hundreds of recipients, as well as newspaper articles. Heather Faubert gave 23 presentations to 1,370 individuals about ornamental pests. These presentations and direct contacts led to reduced use of pesticides in Rhode Island aimed at controlling winter moths and gypsy moths.

- In 2018 there were dying oaks in areas with three years of gypsy moth defoliation, but by August it was noticed that living oaks (those that had leafed out in the spring) were now dying. These trees were inspected and *Agrilus bilineatus* (2-lined chestnut borers) were found in galleries under the bark of dying trees. Since 2014 URI and RI DEM have conducted biosurveillance for EAB using the solitary wasp, *Cerceris fumipennis*. All non-target Buprestids have been identified and counted in these surveys, and this allowed us to see that within this survey, the number of *A. bilineatus* has increased since 2014, and dramatically increased in 2017 and 2018. We hypothesize that this is due to the stress oak trees have endured due to drought and gypsy moth defoliation. Two lined chestnut borers are known to attack stressed oak trees. We intend to assist landscapers and homeowners by identifying this problem on oaks and educating them about treatment options.
- Part of the decline of winter moths can be attributed to the establishment of the parasitoid, *Cyzenis albicans*. We have recovered the Tachinid fly at 6 of 8 release sites. We released the parasitoid from 2011-2017.
- Twilight meetings and other educational programs were conducted for vegetable growers, grape growers, Christmas tree growers, tree fruit growers and small fruit growers.
- The URI Plant Clinic supports efforts in Landscape IPM and Fruit IPM. We received and diagnosed 400 plant and insect samples, and 200 were from landscapes.

# Vermont IPM Extension Implementation Program: 2017-2020

PI: Ann Hazelrigg Co PI: Heather Darby, Terence Bradshaw, Margaret Skinner, Sid Bosworth

## Primary Priority Area: IPM Implementation in Agronomic Crops

### Field Days and Winter Conferences

- Champlain Valley Hops Field Day, Starksboro, VT. September 28, 2018. 40 attendees.

#### IMPACTS:

- 28 attendees indicated they better understood how to identify insect and disease pests of hops.
- 35 attendees indicated they would be able to make more informed choices on practices to implement to reduce pest pressure in their hop yards.

- The 10<sup>th</sup> Annual Hops Conference, Burlington, VT. February 21, 2019. 86 attendees, 10 participants via live broadcast. To view the agenda and presentations, go to <https://www.uvm.edu/extension/nwcrops/conferences-events-current-and-past>

#### IMPACTS:

- 56% of participants that responded to end of conference survey, indicated that knowledge gained from these events helped them optimize (and reduce) fungicide applications in their hopyard.
- 78% of participants that responded to end of conference survey, indicated that knowledge gained from these events helped them reduce insecticide applications in their hopyard.
- 96% of participants that responded to end of conference survey, indicated that the knowledge gained from these events allowed them to better scout, identify, and manage pests with a IPM system.

- The 15th Annual Grain Growers Conference-*Stories of an Evolving Food System*, Essex, VT. March 28, 2019. 113 attendees. To view the agenda and presentations, go to <https://www.uvm.edu/extension/nwcrops/conferences-events-current-and-past>

#### IMPACTS:

- 86% of participants that responded to end of conference survey indicated that knowledge gained from these events that helped them routinely test for mycotoxin and seedborne disease.
- 45% of participants that responded to end of conference survey indicated that they know how to identify the proper environmental conditions and grain development stage to apply fungicides to control fusarium head blight.
- 92% of participants that responded to end of conference survey indicated that knowledge gained from these events helped them better scout, identify, and develop IPM strategies for disease, insect, and weed pests in grains.

### Extension Outreach Education

- The virtual reality (VR) scouting tool was completed and presented at the 2019 Hops Conference. The VRScout Hops information on the homepage of the Hops page on the NWCS webpage, linked here: <https://www.uvm.edu/extension/nwcrops/hops>. The post includes an introduction to the game, the target audience, insects and diseases to identify, a link to the latest edit of the User Manual (PDF), and the game file (must email NWCS to get it – file is too large to post to the webpage).
- Online proceedings for the 10th Annual Vermont Hop Conference are available online and include video recordings of presentations conducted during plenary and advanced sessions. The proceedings are housed at [eXtension's Online campus](#).
- 8 Hop Blog Posts <http://blog.uvm.edu/hoppenin/>
- Hop Power Hour monthly webinars began April 23, 2018 and continued through October 2018. 34 participants. <https://www.youtube.com/watch?v=sNLDK7Mr0h8&t=0s&list=PLaZCgOs78cqi-5V2G3GaLRxFBNgmeM0Nb&index=1>



## **IMPACTS:**

- 94% of participants indicated they would make a change to their farming operation or how they advise farmers in regards to pest management.
- 100% of participants indicated that they have a better understanding of how to scout for downy mildew

**Next Round of Funding:** we will continue extension outreach education through winter conferences, blogs, IPM briefs, IPM guide, summer field days, website updates as well as implementation of the VR Scout Tool. We will continue surveying for IPM impacts.

## **Additional Materials**

### **Agronomy Field Days and Winter Conferences**

- Champlain Valley Hops Field Day, Starksboro, VT. September 28, 2018.  
[https://www.uvm.edu/sites/default/files/media/092818\\_ChamplainVallyHops.pdf](https://www.uvm.edu/sites/default/files/media/092818_ChamplainVallyHops.pdf)
- The 10th Annual Hops Conference, Burlington, VT. February 21, 2019.  
[https://www.uvm.edu/sites/default/files/media/HopConfFlyer2019\\_Final.pdf](https://www.uvm.edu/sites/default/files/media/HopConfFlyer2019_Final.pdf)
- The 15th Annual Grain Growers Conference, Essex, VT. March 28, 2019.  
[https://www.uvm.edu/sites/default/files/media/2019\\_GrainConf\\_Full\\_Brochure.pdf](https://www.uvm.edu/sites/default/files/media/2019_GrainConf_Full_Brochure.pdf)
- Conference presentations: <https://www.uvm.edu/extension/nwcrops/conferences-events-current-and-past>

### **Agronomy Extension Outreach Education**

- Northwest Crops and Soils Program website <http://www.uvm.edu/nwcrops>
- Hop Blog <http://blog.uvm.edu/hoppenin/> **Hop Power Hour Webinar Series**  
<https://www.youtube.com/watch?v=sNLDK7Mr0h8&t=0s&list=PLaZCgOs78cqi-5V2G3GaLRxFBNgmeM0Nb&index=1>
- Julien Venne: Mastering Spring activities in the hop yard. April 23, 2018 27 participants.  
<https://www.youtube.com/watch?v=O5YHly6jMqM&feature=youtu.be>

## **IMPACTS:**

- 89% of participants indicated that they would make a change to their early season practices or how they advise farmers
- 100% of participants indicated that they have a better understanding of spring activities in the hop yard.
- Erin Lizotte: Powdery mildew in the hop yard. May 21, 2018. 18 participants.  
<https://www.youtube.com/watch?v=4QcMimMxDIw>

## **IMPACTS:**

- 100% of participants indicated they would make a change in scouting and treatment of powdery mildew. 100% of participants indicated that they now had a better understanding of powdery mildew and how to identify it.
- Gene L'Etoile: One decade of growing hops: a farmer shares his experiences. June 25, 2018. 18 participants.  
<https://www.youtube.com/watch?v=76Qhx1U86sM&feature=youtu.be>

## **IMPACTS:**

- 100% of participants indicated that they would implement a new practice or strategy from the information gained from the webinar.
- 67% of participants indicated that the information gained from the webinar would help to better manage fertility in their hopyard.
- Trevor Hardy: Information on irrigation systems for hop production. July 23, 2018. 19 participants. <https://www.youtube.com/watch?v=ftjsGrQgxrW&feature=youtu.be>

### **IMPACTS:**

- 100% of participants indicated that they now have a better understanding of irrigation systems for hop production and how it impacts pests.
- 82% of participants indicated that they would make a change in their current hop yard as a result of the webinar.
- Lily Calderwood: Harvest timing and the effect on quality of hops. August 27, 2018. 21 participants.  
<https://www.youtube.com/watch?v=w5N-WufDsSk&feature=youtu.be>

### **IMPACTS:**

- 100% of participants indicated that they now feel better prepared to harvest their hops on time to maximize quality and minimize pest damage.
- 69% of participants indicated that they would make a change in their harvest timing within their current hop yard.
- 10/1/18 – Melanie Lewis Ivey: Information on hop viruses and viroids. October 1, 2018. 14 participants.  
[https://www.youtube.com/watch?v=6sKe\\_Ot0pwM&feature=youtu.be](https://www.youtube.com/watch?v=6sKe_Ot0pwM&feature=youtu.be)

### **IMPACTS:**

- 100% of participants indicated that they have a better understanding of and ability to identify viruses on hops.
- 100% of participants indicated that they would make changes while scouting for and managing viruses in their hop yard.

### **Hop goScout surveys**

- Introductory Survey, topic interest. April 2018. 40 Participants.

### **IMPACTS:**

- 25% of growers had an interest in learning more about pest identification and management, 13% of growers had an interest in learning more about proper fertilization practices, 3% of growers had an interest in learning more about timing of field operations including harvest timing, 15% of growers had an interest in learning more about each of the above categories, 3% of growers had an interest in learning more about marketing or processing, 41% of growers proffered no response.
- Training, crowning, downy mildew scouting. May 2018. 17 Participants.

### **IMPACTS:**

- 18% of growers planned to take no additional actions, 5% planned on adjusting their fertilizer applications, 18% planned on adjusting their training times, 42% planned on implementing crowning/pruning practices to reduce downy mildew inoculum, 90% planned on developing/implementing a regimented scouting schedule.
- Pest and disease scouting. June 2018. 12 Participants

### **IMPACTS:**

- 67% of growers planned to continue scouting as part of their routine, 33% of growers planned to adjust their pesticide applications and minimize application rates.
- Pest and disease scouting, irrigation. July 2018. 7 Participants.

### **IMPACTS:**

- 60% of growers planned on adjusting their irrigation practices, 40% of growers planned on adjusting and reducing their pesticide applications, 20% of growers planned on making no change.
- Pest and disease scouting, harvest timing. August 2018. 7 Participants.

## IMPACTS:

- 29% of growers planned on adjusting their harvest timing, 29% of growers planned on adjusting and lowering their pesticide applications, 42% of growers planned on making no change.

## Primary Priority Area: IPM Implementation in Specialty Crops: Apples and Grapes

### Orchard and Vineyard Scouting Network

- Twelve orchards scouted weekly during 2018 season.
- Fruit sampled at harvest from eleven orchards and one vineyard; assessed for pest-related damage and defects.
- Network growers surveyed for level of confidence in applying IPM practices for decision making, pesticide applications, and economic impact of scouting.
- Network scouting results presented to Vermont Tree Fruit Growers Association [http://www.uvm.edu/~fruit/treefruit/tf\\_meetings/UVMScoutingProjectVTFGA19.pdf](http://www.uvm.edu/~fruit/treefruit/tf_meetings/UVMScoutingProjectVTFGA19.pdf)
- Third-party online reporting platform adopted; operating in testing mode for 2019 season.

#### IMPACTS:

- 100% of network growers used scouting in pest management decision making and reduced or delayed sprays
- 88% of network growers had a net economic benefit (better yield quality/quantity) and/or reduce risks due to scouting
- "With up to date scouting results I have confidence in my spray timing."
- "Scouting allowed us to be more precise in our spray applications and reduce our use of pesticides."
- "I am not sure of the amount of money saved, however, it was significant."

### Apple and Grape IPM Guideline Assessment

- iPIPE IPM Elements adopted as platform <https://elements.ipipe.org/>; Vermont-specific modules in development.

### Extension Outreach Education

- 6,376 page views of UVM Fruit: Tree Fruit & 1,736 page views of UVM Fruit: Grapes from May 2018-April 2019 <http://www.uvm.edu/~fruit/>
- 171 email addresses subscribed to [vtapplegrower@list.uvm.edu](mailto:vtapplegrower@list.uvm.edu) listserv; 277 email addresses subscribed to [vermontgrape@list.uvm.edu](mailto:vermontgrape@list.uvm.edu) listserv
- 31 UVM Fruit blog posts promoting IPM tools, Network for Environmental and Weather Applications (NEWA), and advertising IPM meetings to apple/grape growers. <http://blog.uvm.edu/fruit/>
- 74 one-on-one grower consultations (phone, email, and on-site)
- New England Tree Fruit Management Guide updated to include "Cider Apples" content, February 2019. <https://netreefruit.org/>
- Session planning and presentations:
  - Vermont Tree Fruit Growers Association annual meeting, Middlebury, VT. February 14, 2019 (Recap of the 2018 Season, Post-infection Management of Fire Blight Shoot Blight Stage; Guiding Apple Scab Management with RIMpro; 2018 Orchard Monitoring Project). 72 attendees. [http://www.uvm.edu/~fruit/?Page=treefruit/tf\\_meetings.html&SM=tf\\_submenu.html](http://www.uvm.edu/~fruit/?Page=treefruit/tf_meetings.html&SM=tf_submenu.html)

#### IMPACTS:

- 97% of participants indicated moderate/considerable general knowledge following presentation on Post-infection Management of Fire Blight (48% increase)
- 94% of participants indicated moderate/considerable general knowledge following presentation on Implementing an Apple Scab Management (199% increase)
- "I learned of specific software applications that can be used for scab and fireblight tracking."
- "It was really helpful to see how the products compared; it is hard to make a choice with different products when you think everything is the same (fireblight)."
- "It would be hard to get this information anywhere else any easier than at this meeting."
- "Being new to growing apples, I find I get much needed direction and focus after attending."

- 2018 Vermont Tree Fruit Growers Association annual meeting (Managing Native Bees for Tree Fruit Pollination Trunk Problems in Vermont Apple Orchards; Constraints and Opportunities in Growing Cider Apples in Vermont; Implementing Orchard Monitoring).

**IMPACTS:**

- 55% of participants changed management practices to protect bees (better timing of sprays, habitat development); most often by improving timing of pest management to improve confidence in making pest management decisions.
  - 35% of participants changed trunk health management practices by improving pruning and timing of sprays, better scouting practices, guard removal, and deployment of mating disruption.
  - 14% of participants changed cider orchard management practices to diversify cultivars of cider apples and select pesticides to reduce resistance.
  - 48% of participants changed scouting practices (increased scouting, better trap timing, reduced use of certain pesticides); most often to improve timing of pest management and confidence in making pest management decisions.
  - 9% increase in knowledge on trap deployment and insect identification from previous year.
  - "Scouting completely impacted our timing of pesticide application."
- Presentations (attendees):
    - Cider apple production in Vermont: Constraints and Opportunities (Production de pommes à cidre). Congrès Cidres, vins et alcools d'ici. St Hyacinthe, PQ, Canada. 3/28/2019. (80)
    - Constraints & Opportunities in Producing Cider Apples in the New Market. Montana Grape & Winery Association Annual Conference. Helena, MT. 3/23/2019 (20)
    - Orchard & Vineyard Practice that Improve Farm Sustainability. Montana Grape & Winery Association Annual Conference. Helena, MT. 3/22/2019 (75)
    - Experiences in Lebanon: Strategies for Improving Apple Markets and Implications for Vermont Growers. UVM Apple Program & VT Tree Fruit Growers Assn 123<sup>rd</sup> Annual Meeting. Middlebury, VT. 2/14/2019. (72)
    - Recap of the 2018 Season. UVM Apple Program & VT Tree Fruit Growers Assn 123<sup>rd</sup> Annual Meeting. Middlebury, VT. 2/14/2019. (72)
    - Pollinator Protection Efforts in Vermont: UVM IPM Program & VT Pollinator Protection Committee. Lecture to Greater Cabot Working Landscape Committee, Cabot VT. 01/24/2019. (24)
    - Experiences in Lebanon: Strategies for Improving Apple Markets. UVM PSS Dept Seminar Series. Burlington, VT. 10/12/2018. (18)
    - Sustainability Practices Support Vermont Orchards and Vineyards. Atlantic Seed Association Annual Convention. Burlington, VT. 10/8/2018 (32)
    - Cider Mill Setup and Operation. Commercial Cider Making Workshop, Walden, VT. 8/24/2018.

**Next Round of Funding:** Weekly scouting, fruit sampling at harvest. Annual survey for level of confidence in applying IPM practices (e.g. pest models, monitoring thresholds) for decision making for key pests. The number of growers conducting pest monitoring will be collected and tracked in each year. Annual pesticide applications to manage key monitored diseases and pest will be collected and tracked. Promotion of online IPM Guideline Assessment self-assessment tool. Assessment participants will obtain initial scores and identify practices to adopt. Continue newsletters, blog posts, integrate NEWA in communications, one-on-one consultations (as necessary). An on-farm apple/grape workshop will be held in 2019. Planning and presentations at regional grower meetings (with evaluation of knowledge gained and adoption of IPM practices).

## **Primary Priority Area: IPM Implementation in Specialty Crops: Ornamentals/vegetables in greenhouses/high tunnels and nursery settings**

### **Tri-State IPM**

- 22<sup>nd</sup> annual event held in ME, NH, VT with the main focus of "Stop Tooling Around With Your Pest Management Strategies". Cooperating regional specialists presented and hands-on sessions that focused on the latest IPM tools to more effectively identify and manage pests. Sessions included use of hand held microscopes and magnifiers for pest and natural enemy id, use of pH and EC meters and a disease diagnosis flow chart. This year we had several new faces, many who will be integral to the continued success of this program. This year's

featured speaker was Dr. Juang-Horng Chong, Associate Prof. & Ext. Specialist for Turf & Ornamentals at the Pee Dee Research & Education Center at Clemson University. He presented information on new chemical pesticide chemistries, many of which are compatible with biological control programs. >140 attendees.

<https://www.uvm.edu/~entlab/Greenhouse%20IPM/Workshops/2019/IPMWorkshop2019.html>

#### **IMPACTS:**

##### **Short term:**

- 80% of the attendees learned new techniques including sanitation, pH/EC; better management of natural enemies, plant mediated IPM systems (habitat plants) and dip methods.
- 67% of the attendees used biological control in the past year.
- 38% of the attendees indicated they used some form of a plant-mediated IPM system in their production.

##### **Medium Term:**

- 78% of attendees indicated they had attended our Tristate IPM workshops in the past. 89% of past attendees changed their management practices as a result of attending this workshop.
- 72% of attendees who attended our past workshops indicated this event gave them resources to apply less chemical pesticides and adopt more IPM strategies (i.e. biopesticides, natural enemies, banker, trap or habitat plant use). Amount of chemical pesticide reduction by attendees is as follows: no decrease (1%); <25% (36%); 26-50% (21%); 51%-75% (7%); >75% (19%); do not spray chemical pesticides (16%)

#### **IPM First**

- 2 new operations currently enrolled for 2018 (20 locations received visits over past year)
- Over 50 site visits were made to IPM First sites
- 1 training session for greenhouse staff on pest id and scouting (10 attendees).
- 3 original sites surveyed for adoption of IPM strategies

#### **IMPACTS:**

##### **Short term:**

- 1 location for the first time is marketing plants grown 'neonicotinoid free' as they transitioned away from chemical pesticides to biological control from taking part in this program.

##### **Medium term:**

- 100% of growers who were original IPM First sites use plant-mediated IPM systems regularly in their production.
- 100% of locations reduced chemical pesticides as a result of taking part in the program. 2 indicated a reduction of pesticides of 75-100%; 1 a reduction of 20-50%.
- 100% use biological controls more effectively after over 5 years of starting the program.

#### **Extension Outreach Education**

- Over 4,650 page views on UVM greenhouse/high tunnel/landscape IPM webpages  
<http://www.uvm.edu/~entlab/Greenhouse%20IPM/UVMGreenhouseIPM.html>,
- 4,050 followers on UVM Entomology Facebook page  
<https://www.facebook.com/UVMEntomologyResearchLaboratory/?fref=ts>
- 440 email addresses subscribed to the GreenGrower listserv used to disseminate information related to greenhouse and high tunnel IPM.
- 1 factsheet (Critical Questions to Consider to Help Manage Persistent Pest Problems, link below).
- 8 presentations (links below) Presentation Audience: 140 (Tri-State Greenhouse IPM Workshops); 138 (High Tunnel Conference); 40 (Twilight meetings); 50 (Colombia); 100 (Beirut, Lebanon)
- 1 webinette viewing at Tri-State IPM Workshop.
- 2 IPM presentations to 50 growers of cut flowers in Colombia

#### **IMPACTS:**

##### **Short term:**

- 94% of webinette viewers ranked the strategy a 4 out of 5 for usefulness.

**Next Round of Funding:** Hold the 23<sup>rd</sup> annual Tri-State Greenhouse workshops in ME, NH and VT. Continue individualized training at IPM First site visits and visits to previous participants. Prepare factsheets relating to greenhouse IPM; prepare additional webinette and case studies. Update website with three new pages (webinettes, case studies, plant-mediated IPM systems), continue sending messages via the Greengrower listserv and posts to facebook page.

## Additional Materials

### **Greenhouse/High Tunnel/Nursery Tri-State IPM**

- 2019 Tri-State Greenhouse IPM Resources:  
<https://www.uvm.edu/~entlab/Greenhouse%20IPM/Workshops/2019/IPMWorkshop2019.html>

### **Greenhouse/High Tunnel/Nursery Extension Outreach Education**

- UVM greenhouse/high tunnel/landscape IPM webpages  
<http://www.uvm.edu/~entlab/Greenhouse%20IPM/UVMGreenhouseIPM.html>,  
<http://www.uvm.edu/~entlab/High%20Tunnel%20IPM/HighTunnelIPM.html>,  
<https://www.uvm.edu/%7Eentlab/Landscape%20IPM/LandscapeIPM.html>
- UVM Entomology Facebook page <https://www.facebook.com/UVMEntomologyResearchLaboratory/?fref=ts>

### **Presentations:**

- Brining in Un-Bee-lievable Beneficials Presentation by Cheryl Frank Sullivan & Margaret Skinner  
VNLA/Greenworks Winter Meeting, Feb. 7, 2019  
<https://www.uvm.edu/~entlab/Landscape%20IPM/Powerpoints/BringingInUnbelievableBeneficialsVNLA.pdf>
- **Sullivan, C.E. Frank**, M. Skinner & A. Wallingford. Natural Enemies & Pests Hands-on Demo. Stop Tooling Around with Your Pest Management Strategies. Tri-State Greenhouse IPM Program Hands On Workshop, Manchester, ME, Durham, NH, and Burlington, VT Jan. 8-10, 2019.
- **Sullivan, C.E.F.**, M. Skinner, A. Wallingford & C. Glenister. Identifying the Good, the Bad & the Ugly Hands on Pest & Natural Enemy Id session. Univ. of VT Entomology Research Laboratory, Univ. of NH & IPM Laboratories. Expand Your Tunnel Vision: High Tunnel Production Conference, Manchester, NH - December 3-4, 2018.  
<https://www.uvm.edu/~entlab/High%20Tunnel%20IPM/Presentations/Conference%202018/High%20Tunnel%20Conf%202018%20-%20Insect%20ID%20-%20UVM%20UNH%20IPM.pdf>
- **Sullivan, C.E.F.** & M. Skinner. Lessons Learned from 5 years of Routine High Tunnel Scouting for Insect Pests & Natural Enemies: Lightning Round Update - Univ. of VT Entomology Research Laboratory. Expand Your Tunnel Vision: High Tunnel Production Conference, Manchester, NH - December 3-4, 2018.  
<https://www.uvm.edu/~entlab/High%20Tunnel%20IPM/Presentations/Conference%202018/High%20Tunnel%20Conf%202018%20Lightning%20Round%20-%20UVM%20-%20Cheryl%20Frank%20Sullivan.pdf>
- **Skinner, M.**, B.L. Parker, C.F. Sullivan & A. Davari. **2018**. Advances in IPM in Protected Agriculture: Plant-mediated IPM Systems for Thrips. 50 growers of cut flowers. Rionegro, Colombia.
- B.L. Parker, **M. Skinner** & A. Davari. 2018. A New Innovative Method for Western Flower Thrips Management using UV Light. 50 growers of cut flowers. Rionegro Colombia.
- **Sullivan, C.E.F.**, M. Skinner & B. Spencer. The importance of scouting for pests: tips for success. Success with Bio-control in High Tunnel Vegetables Twilight Meeting. July 26, 2018. Jericho Settlers Farm, Jericho, VT.
- **Sullivan, C.E. Frank**. Greenhouse/Tomato Workshop. Aphid Management & Habitat Plants for Natural Enemies Discussion & Demonstration. May 30, 2018, Intervale Community Farm, Burlington, VT. Organized by Vernon Grubinger, UVM Extension

### **Factsheets & Articles:**

- Skinner, M., B.L. Parker & C.F. Sullivan. 2019. Chapter 31. Integrated Pest Management in Greenhouse and Other Protected Cultivation Systems. In: Current and Future Developments in IPM; Eds: M. Kogan & L. Higley, Burleigh Dodds Science Publ. Cambridge, UK. In press.
- Habitat Plantings Harbor Happy Beneficial Bugs. Sullivan, C. Frank & Skinner, M. VT Vegetable & Berry Newsletter – compiled by Vernon Grubinger, March 12, 2019  
<http://www.uvm.edu/vtvegandberry/Pubs/HabitatPlants.pdf>
- Bringing in Un-Bee-lievable Beneficials. Sullivan, C. Frank & Skinner, M. The Dirt. Winter Issue Vol. 44(4):23-24.
- Using Biocontrols to Manage Aphids in High Tunnels. Sanchez, E., C. Frank Sullivan & M. Skinner. New Jersey Agricultural Trade Show & Convention Proceedings, Feb. 5-9, 2019, Rutgers University, NJ.

- What have we been up to in 2018? Sullivan, C.E.F. Skinner, M. & Parker, B.L. Tri-State Greenhouse IPM Workshops. Manchester, ME., Durham, NH & Burlington, VT. 2pp.
- Critical Questions to Consider to Help Manage Persistent Pest Problems. Sullivan, C.E.F. & M. Skinner. Univ. of VT Entomology Research Laboratory. Expand Your Tunnel Vision: High Tunnel Production Conference, Manchester, NH - December 3-4. 1p. <https://www.uvm.edu/~entlab/High%20Tunnel%20IPM/Presentations/Conference%202018/Critical%20Questions%20&%20Habitat%20Plants%20UVM%20High%20Tunnels%2012-2-2018.pdf>
- Sullivan, C.E.F. & M. Skinner. Attracting & Sustaining Aphid Natural Enemies in High Tunnels. Univ. of VT Entomology Research Laboratory. Expand Your Tunnel Vision: High Tunnel Production Conference, Manchester, NH - December 3-4. 1p.

#### Press Coverage:

- Flower Power at the Hildene: <http://vermontnews-guide.com/flower-power-at-hildene/>

### Primary Priority Area: IPM Implementation in Communities

#### Master Gardener Course

- Master Gardener Course delivered through web platform. January 18-May 10, 2019. 15 modules over 40 hours of course work. Plant Diagnostic Clinic Program Support of IPM Communities (PDC Team) delivered lectures: entomology, plant pathology and turf care. 95 participants.
- 356 EMG volunteers logged 12,156 hours at 86 ongoing projects and events (fairs, Ask a Master Gardener tables, Farmers Markets, other outreach), and 45 one-time events making 73,467 contacts with the public about home gardening, pesticide reduction, sustainable landscapes, pest identification and IPM strategies.

#### IMPACTS:

- Will be reported after the course finishes in May of 2019

#### Master Gardener Helpline

1,002 questions answered by phone and email

- 90 specimens submitted for pest identification
- **IMPACTS:**
  - Approximately 95% of calls provide IPM information (pest lifecycle, non-pesticide management options) to the home gardening public.
  - "Lots of good written and in-person cultural information for reducing the problem." "I don't know where else I would turn to if they weren't available." "I was able to start making helpful gardening changes right away, and have a plan for better prevention for next season." "I am always impressed by the quick responses and helpful information."

#### Advanced Training Webinars

- April 2018 Spring Pest and Disease Advanced Training for Master Gardeners. 110 views.
- June 2018. UVM Extension Master Gardener Helpline Advanced Training 15 views
- November 2018 Fall (End of Season) Pest and Disease Advanced Training for Master Gardeners, 22 views
- **IMPACTS:**
  - 147 people watched these advanced trainings in 2018.

#### Hands-On Summer Courses:

- In the summer of 2018, we offered urban pest and disease walk, a forest walk focused on the safe and judicious use of pesticides for invasive plant eradication, a hands-on workshop for vegetable diseases and pests and 2 hands-on sessions using IPM strategies when fertilizing your vegetable garden. 79 participants.

**Next Round of Funding:** Offer EMG course in 2020. In April of 2019 the 2018 Master Gardener Course students will be surveyed to assess if they adopted an IPM practice and reduced their use of pesticides. We will survey 2019 Master Gardener Helpline clients at the end of the season to see if they adopted an IPM practice that reduced pesticide use.

Factsheets will be developed to be used during the workshops as well as distributed to our 300 master gardeners after the course, and the general public at fairs, farmers markets and other community events around the state.

### [Additional Materials](#)

**Master Gardener Course** UVM Extension Master Gardener Course website

<https://www.uvm.edu/extension/mastergardener/extension-master-gardener-course>

**Master Gardener Helpline** UVM Extension Master Gardener Helpline website

<https://www.uvm.edu/extension/mastergardener/helpline>

### **Primary Priority Area: IPM for Pollinator Health**

#### **Master Gardener Pollinator Short Course**

- Currently under development to launch in August of 2019 on eXtension course website.

**Next Round of Funding:** We are currently developing the pollinator course syllabus, reaching out to potential experts to teach various modules, developing the course website and the course advertising materials, such as the flyers website, social media posts, press releases and setting up the pre and post course surveys.

#### **Orchard Pollinator Survey**

- Two orchard blocks (managed, unmanaged) assessed monthly during 2018 season.
- Abundance, diversity, and community composition of pollinators in orchards was catalogued.

#### **IMPACTS:**

- The 2018 UVM Orchard Pollinator Survey provided baseline data for use in developing or assessing IPM programs protective of pollinators in orchard systems.

**Next Round of Funding:** Pan traps in two orchard blocks collected weekly; identify and catalogue collected insects. Apple growers will be surveyed annually to assess level of adoption of specific pollinator protection practices such as timing and choice of pesticides.

#### **Pollinator Habitat Program for ornamentals/vegetables in greenhouses/high tunnels and nursery settings**

- 9 greenhouse/nursery sites trained to establish pest-fighting pollinators through habitat plantings (6 last season, 3 new for this season).
- 1 presentation on habitat planting for beneficials at landscape-nursery annual meeting (30 attendees to session)
- 1 training session on the use of habitat plantings to establish beneficial insects to international students for incorporation into growing systems overseas (12 attendees “2 Lebanese, 2 Korean, 1 biological control producer, 3 growers, 4 University personnel”).
- 300 habitat-planting brochures prepared for participating growers for distribution from retail stores to customers.

#### **IMPACTS:**

##### **Short term:**

- 100% of growers trained to establish habitat plantings last season will continue the use of these systems in the next year.

**Next Round of Funding:** Continue to establish and monitor habitat plantings, work one-on-one with growers, produce and distribute consumer brochure and signs about protecting pollinators and beneficial insect ID, provide updates on websites and social media.

### **Secondary Priority Area: IPM Implementation in Pest Diagnostic Facilities**

#### **Plant Diagnostic Clinic disease/insect/weed diagnostics**



- ~600 disease, insect and weed samples diagnosed and with IPM information provided to commercial growers, Master Gardeners, general public who submitted disease/insect/weed samples.
- ~150 disease, insect and weed email pictures diagnosed with IPM information provided to commercial growers

## IMPACTS:

- 77% of home gardener clients chose an IPM practice as a result of the diagnosis; 60% reduced the use of a pesticide as a result of the diagnosis and average savings was \$218
- 86% of Commercial PDC clients chose an IPM practice as a result of the diagnosis; 61% reduced their use of a pesticide as a result of diagnosis and average savings was \$ 1,421

## Plant Diagnostic Clinic Extension Presentations/Workshops-IPM presentations meetings/workshops >1,000 attendees.

- Initial Pesticide Applicators Meeting, Burlington, VT 4.22.19. (45)
- Initial pesticide Applicators Meeting, White River Junction, 4.23.19 (25)
- Commercial Pesticide Applicators Meeting, Middlebury, VT. 4.5.19 (60)
- Eighth Annual Garden & Landscape Symposium, Ft Ticonderoga, NY. Pests and Problems in 2018 and What to Watch for in 2019 4.6.19 (100)
- VNLA Flower Show, Essex Junction, VT. 3.1.19. Disease and pests of Vermont gardens and landscapes. (75)
- Ecological Landscape Alliance (ELA) Conference, Amherst, MA. 3.5.19. What is wrong with my tree and when to call and arborist? (100)
- Ecological Landscape Alliance (ELA) Conference, Amherst, MA. 3.6.19. What is eating my trees? (100)
- New Hampshire Landscape Recertification Course, Concord, NH. 2.18.19. Diseases of landscape trees and shrubs. (50)
- VT Master Gardener Plant Pathology Lecture webinar. 2.14.19. (160) Evaluation in progress
- VT Vegetable and Berry Growers Association Annual Meeting, Fairlee, VT. 2.21.19. Looking back at the 2018 season- diseases and pests. (200)  
[https://www.uvm.edu/vtvegandberry/VVBGAMeeting2019/Hazelrigg\\_Pest\\_Update.pdf](https://www.uvm.edu/vtvegandberry/VVBGAMeeting2019/Hazelrigg_Pest_Update.pdf)
- NH High Tunnel Conference, Manchester, NH. 12.3.18 Identifying and managing tomato diseases in high tunnels. Sideman, Smith and Hazelrigg. (200)
- New England Greenhouse Conference, Boxborough, MA. 11.6.18. (120)
- Advanced Training Master Gardener webinar 6.20.2018 (20)
- VT High Tunnel Workshop 5.30.19 (50)
- Newport Garden Club. Disease and Pest presentation 4.10.18 (35)
- Plant Disease and IPM lecture at Master Gardener Course. (100)
- Eight Across the Fence Extension Television programs on IPM/pests/diseases.

## Impacts:

- 56% of field/forage pest specialists indicated increased IPM knowledge as a result of presentations at a 2019 meeting; 17% adopted a new IPM practice as a result of presentations at a 2018 meeting.

## Contribution to Newsletters/Publications

- Bi-weekly VT Vegetable and Berry Newsletter column on current/emerging disease/insects/weeds and IPM.
- Contribution of Vermont pest and disease info for the weekly UMASS Veg Notes
- Quarterly articles in *The Dirt* on disease and pests for the VT Nursery and Landscape Association
- Contributor to the New England Vegetable and Small Fruit IPM Guidelines

## Secondary Priority Area: IPM Education for Pesticide Applicators

- Currently in the process of developing 3 online short courses for Pollinator Health for Blueberry, apple and nursery growers and accompanying factsheets. Course will be launched summer/fall 2019

## IPM State Report (2018-'19) - West Virginia

The IPM team members in West Virginia have been carrying out Extension IPM programs in primarily in the areas of Specialty Crops and Urban Horticulture (Master Gardeners).

Significant outputs of past 12 months:

1. Implementation of EQIP cost-share program for one commercial orchard in the Potomac Valley Conservation District (2018).
2. Initiation of EQIP cost-share program for two commercial orchards in the Eastern Panhandle Conservation District (2019)
3. Initiation of Citizen Science Project with Master Gardeners to correlate pest emergence/phenology with site-specific weather monitoring activity.
4. Continued publication of quarterly IPM Chronicle newsletter
5. Determination of a degree-day model to manage the invasive weed Japanese stiltgrass (*Microstegium vimineum*).
6. Continued programming in Greenhouse IPM through deployment of biocontrol agents.
7. Publication of an IPM Brochure
8. Development of an IPM Booth for display at State Fair and other conferences.

### Success Stories

#### Entomology

**Mating disruption.** Control of clearwing borers in tree fruit has traditionally been provided by the organophosphate insecticide chlorpyrifos. However, surveys of West Virginia growers had indicated that alternatives to chlorpyrifos were needed because of use restrictions, environmental concerns, and/or the products failure to control the pest. Follow-up communications with growers who had indicated the failure of chlorpyrifos to control the pest revealed that control failures were due to improper application timing and not product efficacy. A concerted effort to promote and educate growers on the implementation of mating disruption in orchards was initiated at commodity meetings and workshops. A 3-yr demonstration trial was also conducted in Hampshire County, WV, which showed that management of clearwing borers using mating disruption provided equivalent levels of control compared to chlorpyrifos. During the course of the previous grant cycle three major tree fruit growers (Shanholtz, Cook, Orr) in the state have implemented mating disruption in peach and/or apple to control clearwing borers, which has effectively decreased pesticide use and crop loss on these farms. This year, one grower (Shanholtz) expanded the use of mating disruption to include control of codling moth and oriental fruit moth in 80 acres of apples.

**Insect monitoring in tree fruit.** Major insect pests of tree fruit were monitored in three different locations of the state in 2018 (expanded from one site in 2014-2017; Jefferson Co.) to provide important, time sensitive information to growers in these regions. Monitoring for insect pests was conducted in Jefferson, Hampshire, and Monongalia Counties, WV. Temperature data collected from weather stations located at these sites were used to calculate accumulated degree-days (DD) from biofix for codling moth, Oriental fruit moth, and tufted

apple bud moth. Additional pest monitoring for redbanded leafroller, oblique banded leafroller, dogwood borer, peach tree borer, lesser peach tree borer, apple clearwing moth, San Jose scale, spotted tentiform leafminer, tarnished plant bug, and European apple sawfly was also conducted at the Monongalia and Hampshire County locations. Biofix dates and weekly trap captures for insect pests was emailed to growers and county Extension agents. Growers using this information were better able to time insecticide sprays on farms. Two growers (Shanholtz and Ruggles), used this information to control pests on approximately 100 acres of apple.

**Monitoring in field/row crops.** Monitoring for corn earworm in field/row crops was conducted in 2018 in Wetzell, Wood, Harrison, and Monongalia Counties, WV. Additional pest monitoring for armyworm (true), fall armyworm, European corn borer, and western bean cutworm was also conducted at the Monongalia County location. Weekly trap captures for insect pests was emailed to growers and county Extension agents.

## **Plant Pathology**

**Disease alert and prediction to decrease antibiotic use.** Spread of vegetable diseases, specifically cucurbit downy mildew (CDM) and late blight of tomato and potato was tracked through CDM-IPMPIPE and USAblight.org, respectively. Disease prediction was provided to the county agents and growers through AgAlert from disease occurrence reports in neighboring counties and analysis of disease conducive weather condition. Once disease was confirmed in the state, it was reported to the online map so that beneficiaries could follow the disease movement and spread. I also participated at the weekly CDM conference calls during the growing season and set sentinel plots to report disease outbreak to the online system and make growers aware of the disease spread with recommendation of measures should be taken. These AgAlerts helped growers taking preventative measures at the time when it was necessary.

**Decision support system for apple fire blight management.** We set weather stations at the major tree fruit growing counties and subscribed to the disease model data from Spectrum technologies and network of environment and weather applications (NEWA). Fire blight models (Maryblit and Cougar blight) were optimized to predict epiphytic infection period (EIP) and associated risk to relate need for streptomycin spray. Data were accessed remotely, and spray recommendations sent to growers by text messages. Feedback obtained from growers indicated that adoption of preventative measures against CDM and late blight of tomatoes and potatoes prolonged harvest season by two and three weeks, respectively. This would translate achieving higher yield and behavior change of growers. Decision support system for fire blight management helped growers cutting back unnecessary use of streptomycin without compromising level of disease control. This also reduced the risk of antibiotic resistance development in bacterial organism *Erwinia amylovora*.

**Tomato disease management with resistant varieties.** As late blight hits tomato and potato production in WV every year, we promoted late blight resistant 'WV'63' tomato together with

newly released cultivars ‘Mountaineer Pride’ and ‘Mountaineer Delight’. These two cultivars possess higher tolerance to Septoria leaf spot (SLS) in addition with late blight resistance. We received overwhelming seed request from small growers all over the state and distributed 1500 seed packets. Each seed packet accompanied with an instruction sheet for seed saving, production technique and feedback. Most feedback came through email as opposed to paper mail. A total of 123 feedbacks were received, where growers rated these three cultivars on a 1-3 scale for total yield, taste and SLS tolerance. Data shown in Fig. 1 indicates highest yield was obtained from ‘Mountaineer Pride’ but ‘Mountaineer Delight’ has better taste and SLS tolerance. We also promoted tomato and pepper grafting as an IPM tool for managing soil-borne diseases. Five workshops on grafting tomatoes and peppers on resistant rootstocks were conducted with growers and plant propagators with an average participation of 15 people. In addition, a demonstration trial was also set at the WVU organic farm to show the benefit of using grafted tomatoes. Due to the involvement of technical component in grafting, not every participant wanted to do it by themselves, but it motivated them buying grafted transplants.

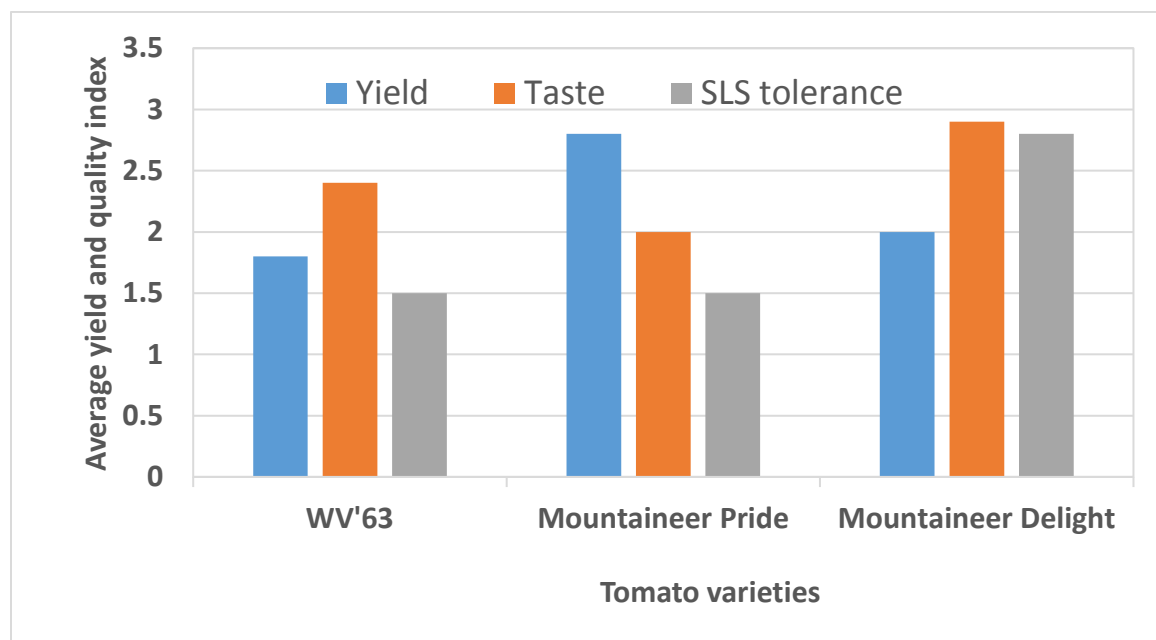


Fig. Compilation of feedback data from tomato growers who received seeds from WVU, showing comparative performance of different varieties in their field/garden.

**Monitoring strobilurin and streptomycin resistance.** Fungal and bacterial isolates for apple scab and fire blight, respectively were collected from apple orchards where strobilurin fungicides and streptomycin antibiotic were used. Isolates were subjected to various concentrations of fungicides and antibiotic for assessing sensitivity to chemicals. No resistance in isolates were detected, which correlates with no apparent control failure.

**IPM support for diagnostic facilities.** Disease diagnosis and management recommendations were provided to all clientele who contacted WVU plant diagnostic clinic with plant problem.

Outcomes from such diagnostic measures are far reaching as it also educates clientele on management options for such disease outbreak and how to take preventative measures. Video clip from one of our greenhouse growers is the testimony of our service and need for continued support.

## **Weed Science**

**Weed ID Fact-Sheets.** Proper identification of weeds, especially, non-native invasive, obnoxious, and poisonous weeds is essential to manage them in forages and other crops of West Virginia. In 2018, there were reports of over 30 livestock deaths in the Eastern Panhandle region of the state. Inspection of the sites revealed the presence of Perilla mint (*Perilla frutescens*) a highly poisonous weed in pastures apart from a few other potentially poisonous weeds such as Jimsonweed (*Datura stramonium*) and nightshades (*Solanum* spp.) in low numbers. A conscientious effort was taken to come up with fact-sheets related to identification and management of 10 such weeds as web-based publications in 2018. Fact-sheets were disseminated through social media to WVU Extension clientele during the growing season (May-October). Based on website traffic data analyses there was 8 times more traffic in the page views during this period in 2018 compared to that in 2017. We are currently in the process of consolidating various list-serves to reach out to a wider audience in 2019.

**Management of Invasive Grasses.** Effective methods to manage jointhead Arthraxon (*Arthraxon hispidus*) and Japanese stilt grass (*Microstegium vimenum*) invasive annual weeds in pastures and hayfields, was developed as a result of field research during 2016 to 2018. Results were disseminated to growers through the Pesticide Recertification Video. Livestock producers have indicated that they now have a viable tool to control these weeds in their pastures. County agents reported over 25 calls for recommendations to manage them in 2017 and 2018 as a result of our research efforts.

**Weed ID Display.** A collection of approximately 75 live weed specimen was developed and was displayed at the West Virginia State Fair (the Fair Board requested it be repeated in 2019), State Small Farm Conference, County Agents Training Meeting etc., and was considered to be useful.

### Respectfully submitted by:

Rakesh Chandran,                      IPM Coordinator, Extension Weed Specialist

### Team Members:

Daniel Frank	Extension Entomologist
Mahfuz Rahman	Extension Plant Pathologist
Mirjana Danilovich	Extension Consumer Horticulture Specialist
Allison Nichols	Extension Evaluation Specialist
Barbara Liedl	Associate Professor (WVSU Collaborator)

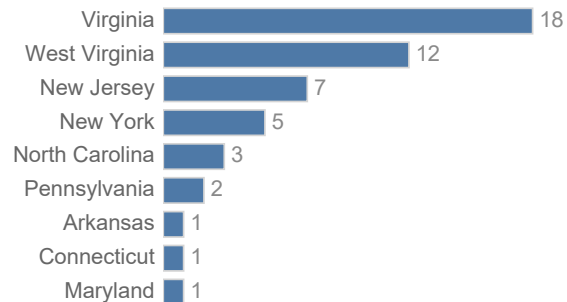
# National *Haemaphysalis longicornis* (Asian longhorned tick) Situation Report

As of February 12, 2019

*Haemaphysalis longicornis* (Asian longhorned tick), an exotic East Asian tick, has never previously established a population in the United States. It is a known serious pest of livestock in the Australasian and Western Pacific Regions where it occurs. It is an aggressive biter and frequently builds intense infestations on domestic hosts causing great stress, reduced growth and production, and severe blood loss.

The tick can reproduce parthenogenetically (without a male); as such, a single fed female tick can create a population. It is also a known/suspected vector of several viral, bacterial, and protozoan agents of livestock and human diseases. This three-host tick can spread pathogens among a diverse host range, on which it feeds side-by-side with other tick species. The detections detailed here are the first reports of this tick out of quarantine in the United States.

## States with confirmed local Asian longhorned tick populations with number of counties in each state



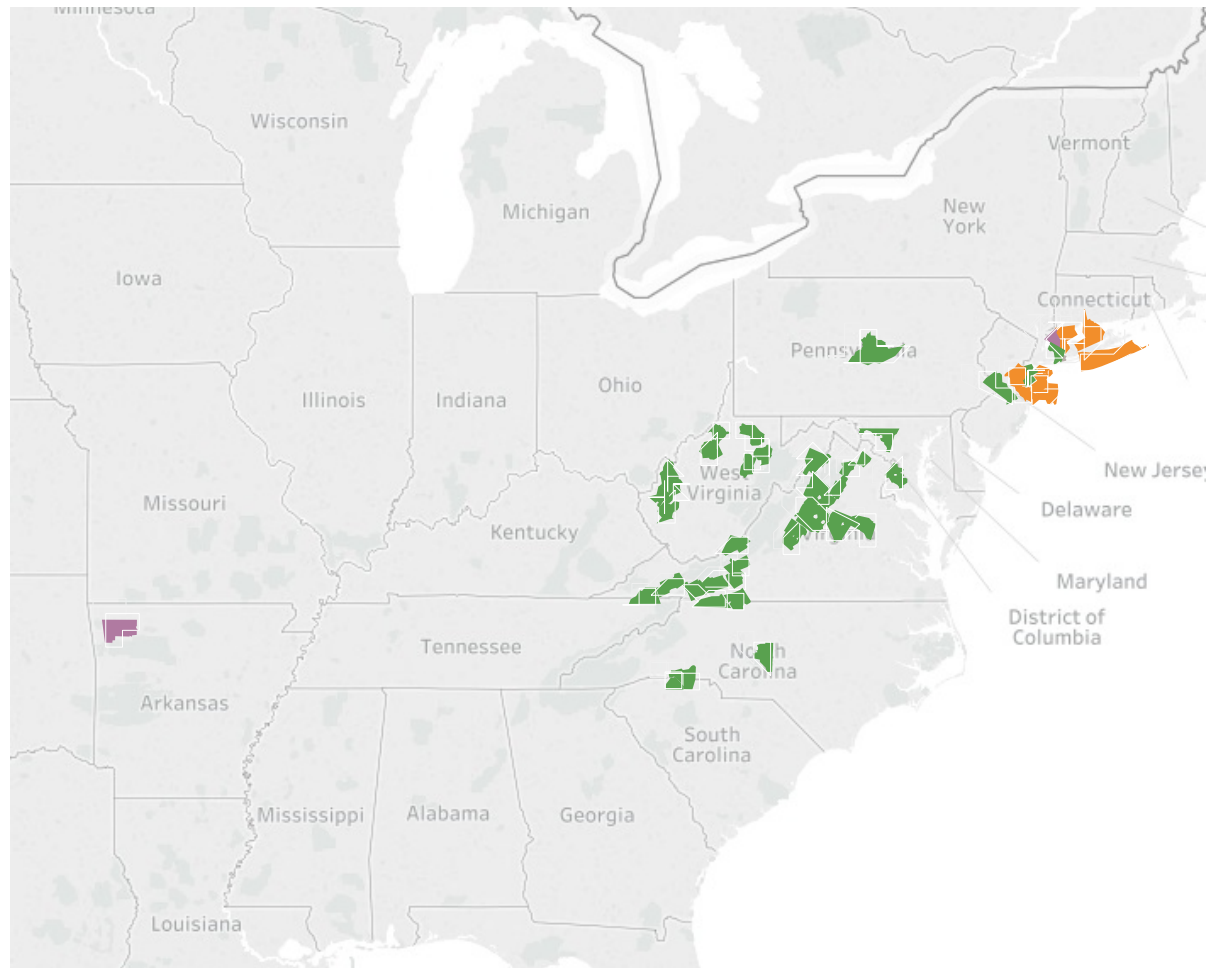
### Type of identification\*

■ Molecular and NVSL

■ NVSL

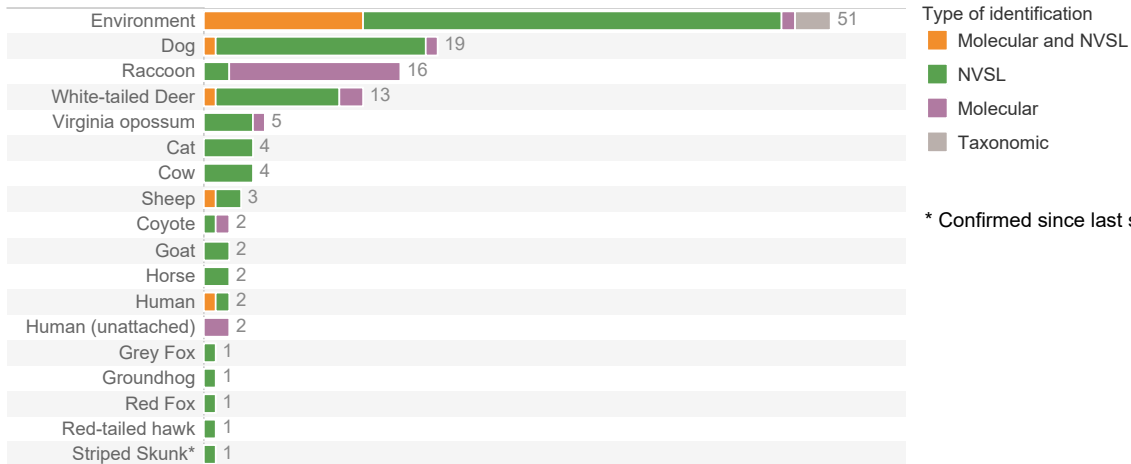
■ Molecular

■ Taxonomic

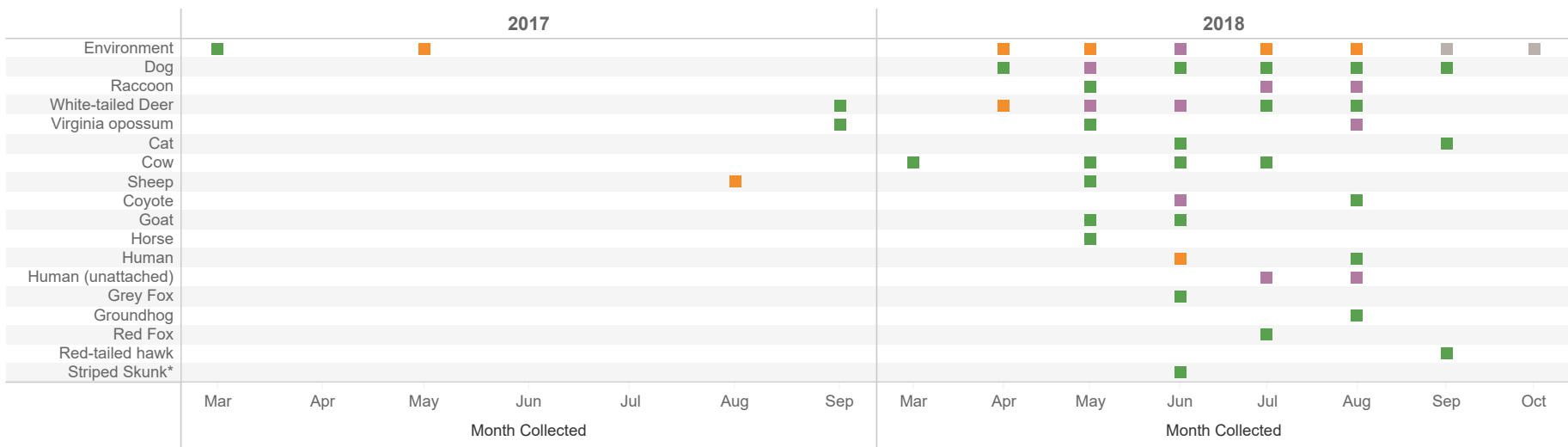


# Asian longhorned tick positive hosts information

## Number of positive hosts



## Timeline of Asian longhorned tick host positives



Prior to 2017, ticks were collected from a white-tailed deer in 2010 and a dog in 2013.

## First date of Asian longhorned tick detections by state, county, and host

State	County	Host	Earliest collected	Earliest confirmed	
Arkansas	Benton	Dog	5/1/2018	6/5/2018	Molecular
Connecticut	Fairfield	Environment	7/3/2018	8/28/2018	Molecular and NVSL
Maryland	Washington	White-tailed Deer	6/25/2018	7/26/2018	NVSL
New Jersey	Bergen	Environment	7/12/2018	7/16/2018	NVSL
		Human (unattached)	7/5/2018	7/25/2018	Molecular
	Hunterdon	Environment	5/10/2018	6/8/2018	NVSL
		Raccoon	5/3/2018	5/25/2018	NVSL
		Sheep	8/1/2017	11/9/2017	Molecular and NVSL
		Virginia opossum	5/3/2018	5/25/2018	NVSL
		White-tailed Deer	4/19/2018	4/24/2018	Molecular and NVSL
	Mercer	Environment	5/10/2018	6/4/2018	Molecular and NVSL
	Middlesex	Dog	9/6/2018	9/26/2018	NVSL
		Environment	5/10/2018	5/14/2018	Molecular and NVSL
		Goat	5/24/2018	6/4/2018	NVSL
		Sheep	5/17/2018	5/23/2018	NVSL
	Monmouth	Environment	8/7/2018	8/17/2018	Molecular and NVSL
	Somerset	Cat	9/28/2018	10/26/2018	NVSL
		Dog	7/31/2018	9/6/2018	NVSL
		White-tailed Deer	5/27/2018		Molecular
	Union	Dog	5/30/2013	6/4/2018	Molecular and NVSL
			6/4/2018	6/15/2018	NVSL
		Environment	5/1/2017	4/23/2018	Molecular and NVSL
			5/6/2018	NVSL	
		Groundhog	8/4/2018	9/4/2018	NVSL
		Horse	5/1/2018	6/1/2018	NVSL
		Human (unattached)	8/3/2018		Molecular
Raccoon		5/6/2018		NVSL	
		7/25/2018		Molecular	
	Virginia Opossum	8/1/2018		Molecular	
New York	Bronx	Environment	6/18/2018		Taxonomic
	Richmond	Environment	5/22/2018	8/14/2018	Molecular and NVSL
	Rockland	Environment	6/21/2018	8/27/2018	Molecular
	Suffolk	Environment	8/24/2018	10/4/2018	Molecular and NVSL
	Westchester	Human	6/4/2018	6/28/2018	Molecular and NVSL
North Carolina	Davidson	Human	8/1/2018	9/20/2018	NVSL
	Polk	Virginia opossum	9/15/2017	6/25/2018	NVSL
	Rutherford	Dog	8/14/2018	9/14/2018	NVSL



## First date of Asian longhorned tick detections by state, county, and host

State	County	Host	Earliest collected	Earliest confirmed	
Pennsylvania	Bucks	Environment	5/23/2018	9/4/2018	NVSL
	Centre	White-tailed Deer	7/10/2018	7/26/2018	NVSL
Virginia	Albemarle	Cow	3/1/2018	5/14/2018	NVSL
		Environment	6/6/2018	7/3/2018	NVSL
		Striped Skunk	6/10/2018	11/30/2018	NVSL
		White-tailed Deer	6/2/2018		Molecular
			8/28/2018		NVSL
	Augusta	White-tailed Deer	6/10/2018	9/13/2018	NVSL
	Carroll	Dog	7/1/2018	8/31/2018	NVSL
	Clarke	Red Fox	7/4/2018		NVSL
	Fairfax	Environment	3/27/2017	6/7/2018	NVSL
	Giles	Environment	6/23/2018	7/27/2018	NVSL
	Grayson	Environment	5/8/2018	7/27/2018	NVSL
	Louisa	Goat	6/12/2018	6/28/2018	NVSL
	Page	Cow	6/25/2018	6/29/2018	NVSL
		Red-tailed hawk	9/17/2018		NVSL
	Pulaski	Cow	7/5/2018	7/11/2018	NVSL
		Grey Fox	6/13/2018	9/13/2018	NVSL
	Rockbridge	White-tailed Deer	5/25/2018	9/13/2018	NVSL
	Rockingham	White-tailed Deer	7/25/2018		NVSL
	Russell	Dog	6/1/2018	8/31/2018	NVSL
	Scott	Dog	7/1/2018	8/31/2018	NVSL
	Smyth	Environment	6/7/2018	6/28/2018	NVSL
Staunton City	White-tailed Deer	6/15/2018	9/13/2018	NVSL	
Warren	Horse	5/10/2018	5/25/2018	NVSL	
Wythe	Environment	6/23/2018	7/23/2018	NVSL	

## First date of Asian longhorned tick detections by state, county, and host

State	County	Host	Earliest collected	Earliest confirmed	
West Virginia	Barbour	Dog	8/31/2018	11/16/2018	NVSL
	Cabell	Dog	7/10/2018	8/7/2018	NVSL
	Hardy	Cat	6/21/2018	7/10/2018	NVSL
		Cow	5/18/2018	5/21/2018	NVSL
		Dog	6/21/2018	7/23/2018	NVSL
	Lincoln	Dog	4/19/2018	6/27/2018	NVSL
	Marion	Cat	6/7/2018	7/6/2018	NVSL
	Mason	Dog	7/7/2018	7/11/2018	NVSL
	Monroe	Environment	7/2/2018	7/9/2018	NVSL
	Putnam	Dog	5/2/2018	6/18/2018	NVSL
	Ritchie	Dog	5/26/2018	6/19/2018	NVSL
		Environment	7/6/2018	7/23/2018	NVSL
	Taylor	White-tailed Deer	9/1/2017	6/28/2018	NVSL
	Tyler	White-tailed Deer	8/31/2010	6/25/2018	NVSL
	Upshur	Coyote	6/22/2018		Molecular
			8/21/2018	8/24/2018	NVSL

## Summary of wildlife sampling for Asian longhorned tick

Animal groups	Host	Number of animals		Number confirmed	
		SCWDS	USDA, Wildlife Services	SCWDS	USDA, Wildlife Services
Bird	American robin	3			
	Baltimore oriole	2			
	Brown thrasher	1			
	Brown-headed cowbird	1			
	Canada Goose	1			
	Carolina wren	4			
	Common yellowthroat	1			
	Eastern phoebe	1			
	Forster's tern	1			
	Grackle	1			
	Gray catbird	7			
	House wren	1			
	Northern cardinal	6			
	Ovenbird	1			
	Red-eyed vireo	1			
	Red-tailed Hawk	1		1	
	Warbler	1			
	Wild turkey	6			
	Wood thrush	2			
	Yellow warbler	2			
Mammal	Black bear	108			
	Bobcat	2			
	Coyote	6		2	
	Domestic dog	2			
	Eastern chipmunk	1			
	Eastern cottontail	16	1		1
	Eastern woodrat	2			
	Elk	13			
	Fox	2			
	Gray fox	3		1	
	Gray squirrel	1			
	Groundhog	26	4	1	4
	Hispid cotton rat	2			
	Hog	1			
	Human	9		1	
	Meadow vole	1			
	Mule Deer	10			
	Peromyscus sp.	56			
	Raccoon	81	5	16	5
	Red fox	4		1	
Striped skunk	4	1		1	
Virginia Opossum	80	3	5	3	
White-tailed deer	255	2	14	2	
<b>Grand Total</b>		<b>729</b>	<b>16</b>	<b>42</b>	<b>16</b>

## Counties with Asian longhorned tick positive premises

