



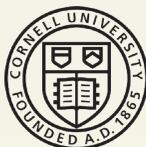
New York State

Integrated Pest Management

Program

The year in review

2018—2019



Cornell Cooperative Extension

Director's Message

With new arrivals like the Asian longhorned tick, New York's pest problems are everchanging; so is pest management. Crop production, tillage, pruning and harvesting practices all look different than a generation ago. Old, broad-spectrum chemical pesticides are giving way to biologically-based and species-specific products. But IPM principles are just as relevant today as they were when the concept of IPM was developed over a half century ago. For example ...

Prevention: Together with our state agency partners, we're holding off the introduction of spotted lanternfly into New York, while preparing growers for its eventual arrival.

Monitoring: Our network for environment and weather applications (NEWA) is more in demand than ever, incorporating weather data into pest prediction models.

Risk Reduction: Two decades of researching and teaching low chemical use practices on state park golf courses, and measuring environmental impact, have made us national leaders in risk reduction in golf.

Decision-making and record keeping: Our apps for sweet corn, hops, and conifers will soon join those we created for greenhouse biocontrol, western bean cutworm, and field crops scouting.

Non-chemical control: We're testing and teaching cultivation and cover cropping for weed management, and raising awareness of biological control approaches.

Protecting non-target organisms: IPM goals of protecting humans, wildlife, pets, and beneficial organisms—including pollinators—are alive and well.

IPM is perpetually new and fresh, and ready to address today's challenges on farms and in communities. Please read on and learn what the New York State IPM Program (NYSIPM) has been up to lately.

Jennifer Grant, Director



Our Partners



"The New York State IPM Program has been integral to growing our agricultural industry over the years, from helping to protect our farmland, crops and natural resources, to insuring the viability and profitability of our farming operations. By incorporating IPM methods, our farmers have seen many benefits through cost savings, increased yields, and water quality improvements. Our farms, forests, and economy are better for it. We appreciate our partnership with the IPM Program, in particular, as we continue our work to guard against destructive invasives like spotted lanternfly, to enhance success of our farms, to protect natural resources, and to improve our quality of life."

Commissioner Richard Ball, NYS Department of Agriculture and Markets



"DEC partners with the Cornell University-based New York State Integrated Pest Management program to identify and promote effective, science-based strategies to reduce or eliminate the impacts of pests on buildings, property, vegetation, and human health in agricultural and community settings. These important efforts aim to reduce use of conventional pesticides by providing educational resources, technology, and demonstration projects based on scientific investigations and field testing."

Commissioner Basil Seggos, NYS Department of Environmental Conservation

Highlights of 2018–2019

Three Decades of Successful Grape IPM

Thirty years ago, New York State grape growers faced an out-of-control pest, the grape berry moth (GBM)—despite four or five insecticide sprays a year. After developing a new IPM protocol for assessing GBM risk and managing the pest, researchers needed someone to show growers how to use it in their vineyards. That's when, funded by the state, NYSIPM hired its first grape IPM specialist. Once on board, Tim Weigle demonstrated research-based techniques for GBM management to growers in the Lake Erie Region. The program was a wild success. Weigle got growers' sprays down to one or none by applying Cornell IPM know-how. And the crop? Virtually moth-free.

Over the decades, Weigle went on to develop, test, and teach solutions for a myriad of insect, disease, and weed problems in vineyards—not just in NYS, but across the Great Lakes region. He reached over 1,500 growers, processors, and fruit workers annually. How? Via educational meetings, workshops, webinars, podcasts, videos, and newsletters. Likewise, Weigle helped colleagues develop IPM guidelines, field guides, record-keeping software, and most recently collaborated on digital vineyard management tools.

In 1992, Weigle helped develop NEWA, the Network for Environment and Weather Applications. Today, weather stations live-stream data to inform IPM forecasts that address the five main threats to vineyard health. NEWA's online network gives up-to-the-minute decision support so growers know when their crops are at risk—or not—thereby reducing extra sprays. Weigle ushered in e-NEWA, directly delivering NEWA results to growers by email, and in 2019 he doubled Lake Erie weather stations to 44, bringing IPM forecasts to even more grape growers.

Most recently, as the threat of the spotted lanternfly (SLF) looms across New York, Weigle brought his entomology and education skills to the forefront again, leading NYSIPM's SLF awareness and outreach campaign. And his perceptive people-skills remind us that it's not just vineyard managers who need to be vigilant, but every traveler passing through the SLF-infested areas to our south. Weigle has just retired, leaving large shoes to fill in grape IPM.



Grape and Hops IPM Extension Educator Tim Weigle, like some of the pests he helped growers successfully manage, is now a rare sight out in the field. His 2019 retirement from NYSIPM means more than an empty desk at the Lake Erie Research and Extension Lab, his base since its opening ten years ago. For 30 years, Tim partnered with researchers, growers, and industry to protect New York's land and water. We hope Tim is now enjoying the fruits of his labor, literally!

Front cover: **Two splendid September days** saw many visitors to our Open House and Twilight Field Day. Master Gardeners, growers, and researchers chatted with NYSIPM staff about our Christmas tree research and wildflower plots. Can establishing pollinator and natural enemy habitat also reduce pest problems? We're finding out. Project Leaders: Amara Dunn, Elizabeth Lamb, Brian Eshenaur.

Birds and Berries and Bugs, Oh My!

Like all fruit flies, the spotted wing drosophila (SWD) loves berries. But, unlike other fruit flies that wait for fruit to rot and split, SWD females lay their eggs inside perfect, ripening fruit. The eggs hatch into tiny white worms—a nasty surprise, decimating a crop's market value. What's a berry farmer to do? Spraying pesticides—especially on U-Pick farms where families mingle with plants—isn't their preferred plan.

Enter the ruby-throated hummingbird, New York's resident species. Not just a fan of nectar, they also eat gnats, fruit flies, and aphids—gobbling up to 2,000 a day. When we learned a blackberry farmer in Mississippi had success against SWD by attracting hummingbirds into fields, we wondered ... could it work in New York?

To find out, we set up 25 hummingbird feeders per acre in two raspberry fields. We observed hummingbird presence and flight patterns, examined SWD traps, and checked berries for infestation over a four-year period. We found that 80 percent of the birds visiting feeders also spent time in the raspberries; traps caught up to 59 percent fewer SWDs; and every week during peak hummingbird season, up to 56 percent fewer worms were found in fruit.

Our results suggest that hummingbirds reduced SWD fruit damage. We always found more hummers in our raspberry plots over time, because they return each spring to familiar feeding grounds. Studies of feeding habits have shown they try eating new things and remember what they like. So let's cultivate a voracious appetite for SWD in the ruby-throated hummingbird by attracting them into our berry plantings!

Project Leaders: Juliet Carroll, Courtney Weber, Greg Loeb



Hummingbirds can capture insects out of thin air, a practice known as *hummingbird hawking*. We found that this carnivorous habit may actually be reducing SWD numbers in berry plantings. While growers consider the option of 'employing' these partners in IPM, gardeners and homeowners can also encourage hummingbird visits by choosing nectar-rich flowers and shrubs for their property. As the emphasis for pollinator protection grows, we all benefit from partnering with our many, often-ignored, beneficial allies, like hummingbirds.

Location, Location, Location

Each year, rodents cause billions of dollars in losses to the food supply. There is a one-two punch: they both eat and contaminate food. And because rodents can carry dozens of pathogens harmful to people and animals, the stakes are high. In the U.S., new laws require that food facilities take proactive steps to prevent rodent problems.

With the food industry in mind, we designed a research project to understand and improve rodent management in food distribution centers. The goal? Figure out whether the location of trap and bait boxes affects our ability to intercept rodents. The current industry standard is to place rodent devices at regular intervals inside and outside the building, but this doesn't take into account what rodents like, what they need, and how they move. Is there a better way?

For several years our NYSIPM rodent expert inspected the areas around rodent traps and bait boxes, and recorded features that are attractive to rodents like available food, water, shelter, and warmth. He found that instead of old-school placement, traps worked better when positioned near preferred features. Our results can improve IPM protocols—that means less food contamination, less rodenticide, and less time required by pest professionals for device inspection. With this new IPM info, we don't need to build better mousetraps, we just need to know where to put them.

Project Leaders: Matt Frye, Jody Gangloff-Kaufmann, Bobby Corrigan



Who can blame her?

Momma mouse loves the food, water, and warmth often found in food processing and distribution facilities. IPM tactics greatly reduce rodent numbers and protect our food supply in commercial facilities as well as in our homes.



This door may not look welcoming to you, but for rats and mice the gap under the door signals a source of food and shelter. Nearby, there is soil, dense vegetation, railroad tracks ... all things that help rodents hide, burrow, and thrive. Our study confirmed that these elements increased feeding at bait stations (shown inside white circle), which could change the way professionals lay out bait stations in the future.



Corn earworm invades the ear within hours or days of hatching from eggs laid on the silk, leaving no external damage. For this pest, scouting is ineffective. Pheromone traps that monitor adult flight are the grower's best defense.

In 2018, the trap network alerted growers to an over-the-top population of corn earworm, one of four major sweet corn pests. And because IPM spray recommendations for this pest are based on trap catch numbers, that important data helped New York growers respond effectively to this serious threat to a 33 million dollar crop grown on 26,700 acres.

Unfortunately, when a grower or processor finds worms in harvested corn, it's too late to act—but accurate ID can inform plans for the following season. Essential to success is deciding if and when to spray using the appropriate scouting methods and thresholds for each pest. But accurate ID? Easier said than done! Caterpillars can be hard to identify, especially smaller ones.

That's why we developed a larval ID fact sheet highlighting critical distinguishing features. It's just another piece of essential information in the quest for worm-free ears.

Project Leader: Marion Zuefle

"I" is for Identification

Good IPM starts with accurate pest identification—ID for short. Whether you see a pest or the evidence it leaves behind, correct ID is essential. Once you know what you're dealing with, you can determine where it's coming from, the risks it poses, and what conditions must change to eliminate it. Good ID makes IPM work.

Even people who deal with pests all the time need to brush up on their ID skills, so we developed a Structural IPM Short Course to hone the diagnostic skills of pest management professionals, Master Gardeners, and others. Participants attend photo-filled lectures and get their hands on hundreds of real specimens. Critters are grouped by *guild*—their basic ecological niche—such as food pests, moisture-lovers, or blood-feeders. And specimens aren't just bugs. Rodent droppings and gnawed wood get examined too. To aid learning and retention, we created a companion manual. We've offered the course 21 times, teaching the ABCs (you know: ants, bed bugs, and cockroaches) to over 700 people. And our learners learned: over three quarters gained knowledge of pest biology, while 100% improved their ID skills. We identify that as 100% good news for everyone but the pests.

Project Leaders: Matt Frye, Jody Gangloff-Kaufmann



These Master Gardeners from Rockland County, like their counterparts in 20 other Short Course workshops, left feeling more informed and confident in the IPM knowledge they'll share with the public. IPM and Cooperative Extension: a perfect pairing.

In the Weeds

Herbicide resistant weeds. Got 'em? Worried about 'em? There are some bad ones out there. Some of the baddest in New York are horseweed, waterhemp, and Palmer amaranth. A result of repeated exposure to the same chemical sprays, these plants have given us all a lesson on the power of selection pressure. The crisis brought about by these super-tough weeds motivated NYSIPM to hire an integrated weed management specialist to help growers find a diverse blend of solutions.

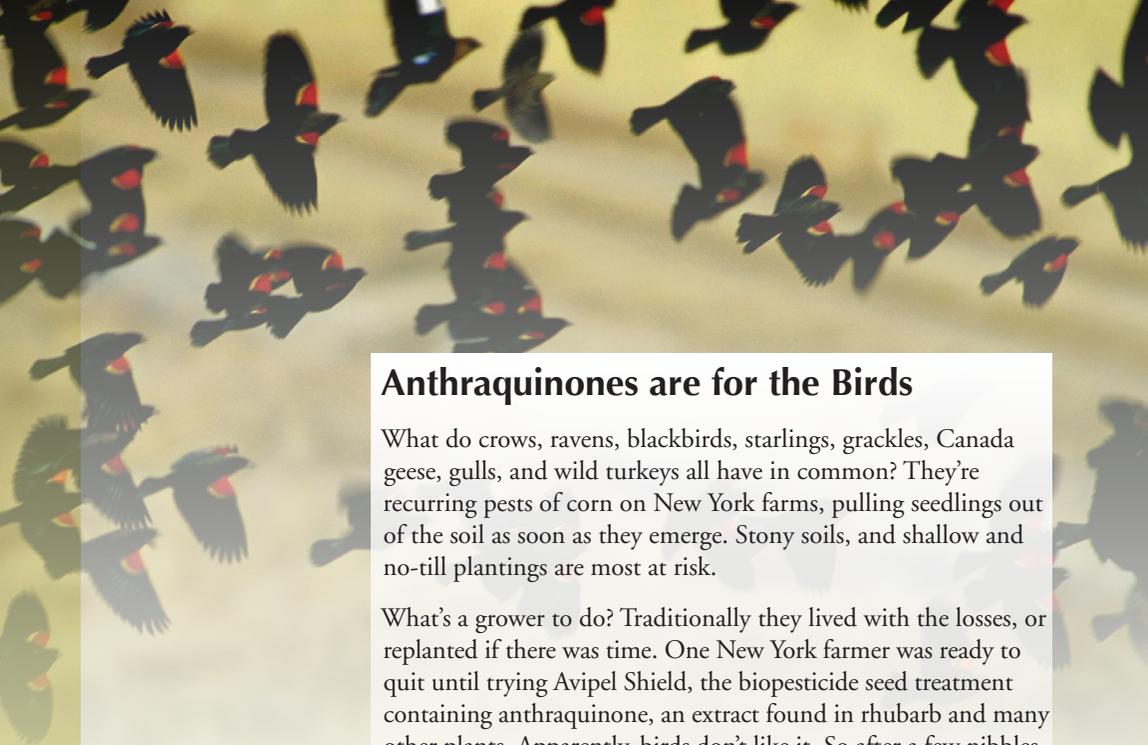
So what can be done? Instead of relying on herbicides alone, use the 'many little hammers' approach: attack weeds with a variety of tactics such as stacked cultivation—a mechanical method that undercuts, uproots, and then buries weeds. Because precision is key in stacked cultivation, GPS and camera guidance help keep tools in line. That's the difference between destroying your weeds or your crop.

What's next? We're providing input on the design of robots able to distinguish between the weeds and the crop—aka autonomous weed control. And we're helping test an electric WeedZapper that has already demonstrated its effectiveness against horseweed. By integrating the latest technology with the oldest, IPM offers growers the many little hammers they need to create a resilient, robust weed management system for their farm.

Project Leaders: Bryan Brown, Venancio Fernandez, Mike Hunter, Jeff Miller, Mike Stanyard



Will waterhemp win? Facing a 56% decreased yield in this waterhemp-infested soybean field, NYSIPM's Integrated Weed Management Specialist, Bryan Brown, leads a project funded by the New York Farm Viability Institute. This herbicide-resistant weed can grow an inch a day, and is an impressive seed producer. Through diversified approaches, the project has provided complete control of waterhemp in some trial sites, prompting 94% of attendees at field events to say they'll follow the lead of this project and modify their tactics for weed control.



Anthraquinones are for the Birds

What do crows, ravens, blackbirds, starlings, grackles, Canada geese, gulls, and wild turkeys all have in common? They're recurring pests of corn on New York farms, pulling seedlings out of the soil as soon as they emerge. Stony soils, and shallow and no-till plantings are most at risk.

What's a grower to do? Traditionally they lived with the losses, or replanted if there was time. One New York farmer was ready to quit until trying Avipel Shield, the biopesticide seed treatment containing anthraquinone, an extract found in rhubarb and many other plants. Apparently, birds don't like it. So after a few nibbles of treated seed, they move on and look elsewhere for food.

NYSIPM set out to test whether anthraquinone worked in fields that suffer major bird damage. Along with extension specialists in eight counties, we conducted trials on treated and untreated seeds in fields that typically suffer heavy loss to birds.

Three years of data confirmed Avipel leaves a bad taste in birds' mouths. Further trials will help farmers know whether treated seed is needed everywhere every year, or if random use can deter feeding. Meanwhile, these tasty results have been a hot topic at field meetings, crop congresses, and certified crop advisor trainings throughout the state.

Project Leader: Ken Wise



Fully fledged. Field Crops & Livestock IPM Extension Educator Ken Wise believes this project's secondary success was its considerable collaboration. Funding came from three different sources over the three-year period—NYSIPM, NYS Corn Growers Association, and the NYS Farm Viability Institute. Just as important was the partnership among 11 farmers, nine extension educators, and one faculty member.

Getting Schooled in Tick Management

Ticks are a problem everywhere, but schools are a special concern. We want kids to spend time outside playing sports and enjoying nature. But we want them to be safe too. Did you know that children aged five to nine years old have the highest incidence of Lyme disease? To help protect children at school, we developed a Tick Awareness and Management for Schools workshop that teaches school facilities staff how to assess and mitigate tick risks. Workshop lessons include tick biology and ecology, how to build a drag mat for detecting ticks, and time outside practicing tick survey methods. Managers learn how to reduce kids' exposure to ticks, and involve teachers and students in the process. First piloted in Suffolk County, the workshop—now offered statewide—continues to improve with participant input.



Think ticks might be a problem on your school grounds? NYSIPM staff offer consultations and risk assessments to help schools determine if ticks are present and abundant. So far, 20 schools have been evaluated, and grounds managers discovered how they could reduce risk or limit areas accessible to kids and staff. School nurses and health educators also benefitted from training, thanks to the NYS Center for School Health Seminars that hosted *Don't Get Ticked NY!* information booths.

Learning how to keep kids safe and avoid ticks is one lesson school professionals won't want to miss.

Project Leaders: Jody Gangloff-Kaufmann, Joellen Lampman

Success! With his pants tucked into his socks, and having just assembled his own tick drag mat, workshop attendee Fred Koebel has a right to feel accomplished. Thanks to the Long Island host district, Three Village—and our training—he's now ready to reduce the incidence of tick bite risk in his own district.



Show and tell. This poster and twelve more like it provide easy-to-understand guidance in the fight against tick-borne disease. Download, print and share. They're just part of the extensive science-based, well-informed resources on our Don't Get Ticked New York website, www.DontGetTickedNY.org. Curious about habitat, repellents, monitoring for ticks, or minimizing risk? You should be. And don't forget that daily tick check!

If You Build It, Will They Come?

Dwindling bee numbers is a problem. The question is not *should* we protect pollinators and create habitat, but *how*? What's the best method? The most economical? The best bee habitats—made up of plants of varying sizes and bloom times—are easy on the eye. They're also excellent real estate for other helpers, like spiders and certain beetles, that eat pests. So can pollinator habitats provide biocontrol benefits too?

To answer these questions, our team set up pollinator habitat plots around our Christmas tree research planting—testing establishment methods, evaluating weeds, counting and identifying the insects attracted, and studying the biocontrol value to the trees.

Wildflower and grass species favored by pollinators were chosen from lists of native perennials. Some started from seed; others were transplants. By the end of the first season, natural enemies and pollinators had arrived—including lady beetles, lacewings, predatory stink bugs, spiders, hoverflies, predatory beetles, butterflies, and many wild bees. This year the plots have matured even more. We collected flying insects with sweep nets, counted butterflies, and caught wasps and bees in brightly colored bowls of soapy water. We even had a method for catching insects moving along the ground.

So far, we have lots of tips for helping growers and gardeners create their own beneficial insect habitat. As to fewer pests in Christmas trees? Time will tell.

Project Leaders: Amara Dunn, Elizabeth Lamb, Brian Eshenaur



Flowers providing pollen or nectar are important to both pollinators and many pest-eating “beneficial” insects. You can help them by choosing a variety of plants that bloom from early spring through late fall with flowers of diverse shapes. This Echinacea makes pollen and nectar readily accessible to both small and large bees, proving that it's not just their beauty that's worthy of our admiration.

What's New with NEWA?

Are summer conditions becoming more unpredictable? Are you wondering how to make informed and timely decisions about pest management? If you say yes to both, you're not alone. NEWA, the Network for Environment and Weather Applications, is here to help by providing live, on-farm decision support for fruit, vegetable, and field crops production. NEWA pairs real-time weather data from growers' fields with online crop-specific pest forecasting. And it's growing every year.

Developed by scientists with pest biology expertise, NEWA models predict disease progression, insect infestations, and crop phenology. Apple growers rely on apple scab forecasts in the spring, grape growers monitor grape berry moth risk through the summer, and field corn growers track western bean cutworm flights throughout the season to know when to scout.

Our latest survey proves NEWA's unparalleled decision support to growers is working. Users attest they saved over \$4,000 in spray costs and more than \$33,000 in prevented crop losses annually.

NEWA partners with extension, industry, and academic partners statewide, including the Lake Erie Regional Grape Program that supports western New York's Concord grape growers. Thanks to the close collaboration between NYSIPM, growers, and processors, that region benefited from the addition of 11 weather stations last year, a move that nearly doubled their decision-making power. NEWA also joined forces with the NYS Mesonet at the University at Albany, a collaboration that resulted in ten pilot locations across the state.

Today NEWA offers 42 models using data from 677 weather stations in 14 states. NEWA and NYSIPM support agriculture throughout New York and beyond. The latest forecast? The future looks bright.

Project Leaders: Dan Olmstead, Julie Carroll, Tim Weigle, Art DeGaetano, Ken Wise, Jamie Cummings, Abby Seaman, Elizabeth Lamb, Jennifer Grant

All I Want for Christmas

Everybody loves a Douglas-fir. Dignified and triangular, they have soft bluish-green needles and are native to temperate rainforests in the United States. Though not a true fir, they are the most Christmassy of Christmas trees for many. And Doug-fir has been popular with growers because of its resistance to deer damage, tolerance for warmer climates and wet soils, adaptability, and ability to grow quickly. That's why it's an important part of New York's multimillion-dollar evergreen tree farming industry.

But Doug-fir has fallen out of favor with tree farmers because of Swiss needle cast disease—a fungal infection that makes the tree lose its needles and its holiday value. This iconic tree has gotten a reputation among growers for needing numerous and costly sprays.

What if this were not the case, and Doug-firs could be maintained with minimal sprays? NYSIPM ran on-farm trials and found that one or two well-timed sprays with good coverage were just as effective as the four or five sprays many growers currently apply.

Likewise, growers who adopted the reduced spray regimen report good results.

Beautiful trees and reduced pesticide applications? That gives everyone a Merry Christmas.

Project Leaders: Brian Eshenaur, Elizabeth Lamb



Onset Station



Douglas-fir



Certiably IPM

Growers and crop consultants need training like everyone else, so they go to school. The Northeast Region Certified Crop Advisers (NRCCA) offer regional and international certifications. NRCCA has online courses and a three-day intensive training conference covering four competency areas. And did we mention exams? Becoming a certified crop advisor takes dedication.

The curriculum covers the management of crops, soil, nutrients, and of course, IPM. NRCCA hosts experts from several universities and representatives from agribusiness who come together annually to facilitate basic and advanced trainings.

NYSIPM is integral to NRCCA training. We offer cutting-edge advanced instruction to students on how to scout for weeds, insects, and crop diseases, along with the latest environmentally-sound management recommendations. NYSIPM has become increasingly involved in field crops and vegetable training, and we now sit on the NRCCA exam board. We developed basic training video content for the IPM, plant pathology, and entomology components of the curriculum. It includes advanced

Pest management is an ever-changing challenge. New pests, cultural practices, and availability of products mean there's always something to learn.

field crops topics like our biologically-based bird repellent project, scouting 101, cereal leaf beetle biocontrol, and the soybean cyst nematode. We also helped NRCCA expand beyond the typical field crops arena by organizing a half-day Vegetable IPM School.

NYSIPM's involvement in NRCCA training is an outstanding opportunity to reach industry representatives, crop consultants, custom applicators, farmers, academics, and soil and water conservation district staff with the IPM message. That's certiably IPM!

Project Leaders: Jaime Cummings, Ken Wise, Abby Seaman

Stubborn Pests: Organic Solutions

All crops have pests. Managing them on certified organic farms is firmly rooted in IPM practices such as crop rotation, sanitation, and the use of pest-resistant varieties. In fact, it's written into the regulations. But despite the best IPM prevention practices, pesticides are still needed for certain stubborn pests. With organic vegetable production gaining in importance in New York—a 28% increase in the number of farms from 2011 to 2016—growers have an even greater need for objective information about allowed pest management products.

To provide that info, we teamed up with Cornell AgriTech faculty members Chris Smart, Brian Nault, and Tony Shelton to conduct trials. At the end of nine years, we have many successes that are effective options for cucurbit powdery mildew, squash vine borer, worms on brassicas, potato leafhopper, and others.

Alas, some pests still have us stymied, namely striped cucumber beetle and cucurbit downy mildew, so pesticide testing will continue. Next up, we focus on pests, beneficials, and weed IPM in organic squash production systems. And, to accommodate the increasing number of researchers working in organic systems, we're helping Cornell AgriTech transition 24 acres of research fields into certified organic production. IPM and organic: natural partners.

Project Leaders: Abby Seaman, Chris Smart, Brian Nault, Tony Shelton



Double damage. The sharp-dressed striped cucumber beetle causes direct damage, massing on newly emerged or transplanted seedlings and sometimes chewing them to the ground, while also transmitting a sometimes-fatal bacterial wilt.

Don't Get Ticked NY!

Ticks are really ticking off New Yorkers worried about Lyme disease, the United States' number one vector-borne pathogen. It's transmitted by the blacklegged tick found abundantly throughout our state. This particular pest can also spread diseases like anaplasmosis, babesiosis, and Powassan virus. Unfortunately, additional tick species abound, and together, the many illnesses they can cause are serious threats to human health. That's why NYSIPM is committed to reducing the impact of these little blood-suckers.



Ticks prefer moist, warm places. Teach children to make tick-checks a personal habit—the last defense against disease transmission. Knowing the spots and bumps on their skin helps them recognize new ones—new ones that happen to have legs.

Recognizing our ability to effectively convey key risk-reducing strategies, the NYS Senate's *Task Force on Lyme and Tick-Borne Diseases* joined the fight by funding our *Don't Get Ticked NY* campaign. We provide easy-to-understand information at the website, and distribute ID cards, infographics and tick removal kits to educators and the public statewide through community events, extension offices and BOCES. Last year we handed out almost 50,000 tick ID cards, a few thousand tick removal kits, and directly reached over 5,000 people.

“Tick-educated” New Yorkers now recognize tick habitats, and—rather than avoid the outdoors—now know how to look and feel for ticks during their daily tick check. While threats from ticks continue to increase, so does New Yorkers' awareness of how to stave them off. So please ... don't get ticked, New York.

Project Leaders: Joellen Lampman, Matt Frye, Lynn Braband, Amara Dunn, Jody Gangloff-Kaufmann



Get the pointy. Our *Don't Get Ticked New York* Tick Kits are popular handouts at events across the state. You can make your own by gathering pointy tweezers, a magnifier, a mirror, alcohol wipes, and a vial or plastic bag to store the offender. But kits won't help you if you don't have them nearby. Our tick cards are the perfect resource to have on hand, and you can print out the same graphics from our website at www.DontGetTickedNY.org.

Nematodes Go to School

For decades, researchers and practitioners alike have played around with beneficial nematodes to control insect pests in turf and agricultural crops. These nematodes are microscopic worms that move through soil looking for host insects to infect. Once inside a grub or other insect, the nematode releases bacteria that feed and reproduce, eventually releasing a toxin that kills the host. As an added bonus, nematodes often persist for years in the soil after just one application—they've been shown to permanently establish in both alfalfa and corn. Nematodes are an ideal biological control agent because they occur naturally in soil and can be applied to boost pest control.

Now these tiny but mighty native worms have been enlisted to help protect school playing fields from pests, and to help teach science, too. Dr. Kyle Wickings, a Cornell entomologist, has been using native New York beneficial nematodes on school playing fields to target grubs, and to reduce the need for pesticide sprays. NYSIPM staff teamed up with him to train teachers in four school districts to add nematode sampling to their science curriculums. In addition to student-collected data, the team inoculated eight playing fields at three schools and then sampled the fields in the fall for signs that the little worms were sticking around. To date, results have been too variable to make recommendations, but our researchers—as tenacious as these worms—will keep on testing.

Project Leaders: Kyle Wickings, Joellen Lampman, Amara Dunn



Steinernema spp. Students learned that these beneficial nematodes (round worms) might be hard to see without a microscope, but are hard at work attacking grubs in the soil under the playing fields.



David Chinery, Horticulture and Turf Educator at CCE Rensselaer County, helps this middle school teacher get her hands dirty. Here, during our *Nematodes in the Classroom* Workshop, she sifts through soil for dead wax worms that indicate whether nematodes are present and successfully parasitizing insects.

The Spotted Lanternfly: They Get Around

Hailing from Asia, the spotted lanternfly (SLF) arrived in Pennsylvania in 2012 on landscaping stone. They've been ravaging vineyards and making a mess of backyards ever since. SLF are clumsy fliers but adept hitchhikers. They lay their eggs on practically any hard surface—wood, rusty metal, railroad cars, and shipping containers are all fair game. SLF has been called, “the worst invasive we've seen in 100 years.” Of their arrival here, New Yorkers now say, “It's not a question of if, but when.”

A bright spot is the incident command structure formed by New York's Departments of Environmental Conservation, Agriculture and Markets, and Parks. They started preparing early, and asked NYSIPM to help with outreach and awareness. Our goal? Immediate identification and education to prevent SLF establishment for as long as possible. Delaying their imminent debut gives us more time to inform the public, while allowing researchers to expand the management toolkit—including the use of natural enemies.

We've created pest alerts, online courses, identification guides, YouTube videos, slide sets, and webinars. NYSIPM talks about SLF a lot. In the first year our staff mentioned SLF in more than 60 presentations, alerting nearly 2,500 participants representing the grape, wine, apple, hops, ornamentals, vegetable, berry, turf, and landscape industries.

The good news? The efforts seem to be working. At the time of printing, a few SLF have been sighted in New York, but no infestations found. We want to give a shout-out to our friends in Pennsylvania who have generously shared information, and to New York's government agencies and extension educators for getting the word out.

Project Leaders: Tim Weigle, Brian Eshenaur, Juliet Carroll, Jody Gangloff-Kaufmann, Jennifer Grant



Dressed to kill. These beautiful yet destructive adult spotted lanternflies are out and about in the late summer and fall. Watch for them, but also for egg masses and nymphs the rest of the year.

2019 Projects

All projects were funded, in part or in full, by the New York State IPM Program. We leveraged additional funds from outside sources. Please find the project reports at ecommons.cornell.edu/handle/1813/41245.

Funding for the NYSIPM Program 2018–2019

In fiscal year 2018-2019, New York State provided the New York State IPM Program \$1,000,000 for Agricultural IPM, \$550,000 for Community IPM, and \$156,000 for Tick IPM. We were further supported by \$285,000 in competitive federal funding through USDA-NIFA's Crop Protection and Pest Management Extension Implementation Program (grant no. 2017-70006-27142), and several smaller grants secured by staff.



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