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Cover photos: Perennials at Canterbury Horticulture (Donna Ellis); Blueberries (Mary Concklin); Greenhouse tomatoes (Leanne Pundt)
The Integrated Pest Management (IPM) Program is a collaboration between UConn Extension and the Department of Plant Science & Landscape Architecture. Since its inception in 1980, the UConn IPM Program has made great strides in developing and implementing sustainable methods for pest control throughout Connecticut. 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. The IPM Program Team includes: Donna Ellis (2018 IPM Program Coordinator, invasive species, curriculum, nursery, and school IPM; retiring in 2019), Mary Concklin (fruit and 2019 Acting IPM Coordinator), Leanne Pundt (greenhouse), Victoria Wallace (school, turf, and landscape), Jennifer Dacey (nursery), Ana Legrand (vegetables), Shuresh Ghimire (vegetables), and Candace Bartholomew (pesticide safety education). Our colleague and plant diagnostician Joan Allen sadly passed away in 2018.

The goal of IPM is to reduce the dependence of agricultural producers and green industry professionals, Connecticut citizens, and schools on pesticides while maintaining or improving productivity, crop quality, and quality of life. The IPM Program has educated growers statewide about the judicious and safe use of pesticides and alternative pest control methods.

Broader adoption of IPM practices enhances responsible pest management and reduced management and production costs; minimizes adverse environmental and economic effects from pests and pest management; results in improved ecosystem quality and plant performance; and improves plant health, quality, yields, and aesthetics. The use of IPM includes cultural controls; biological control agents; biological fungicides; physical and mechanical controls; the use of resistant cultivars; regulatory controls; behavioral modification; and, only when necessary, chemical controls, with the selection of least toxic products. IPM partners and collaborators include 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.

IPM Program team members conduct 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 receive 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, social media, consultations and counseling via phone, site visits to their operations, workshops, conferences, exhibits, and short courses. IPM programs are evaluated through pre- and/or post-program surveys and evaluations, needs assessment surveys, focus groups, key informant interviews, testimonials, and unsolicited comments.

Parsley worm feeding on dill. Photo: Joan Allen
IPM 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. One grower indicated “We likely would have missed a couple of problems that were discovered by the program”; while another indicated “The program helped us dial into a component of our farming efforts we seldom have time to get to otherwise.” Thirty percent of the participants had grape berry moth but did not realize it was present or at treatable levels until it was pointed out to them.

- 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 was delivered to 442 vegetable growers in Connecticut every week from May to September, 2018 through 20 weekly vegetable pest updates focusing on pests, pest management and decision making, and safe pesticide use.

- 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.

IPM Program Funding

The Connecticut IPM Program is a collaboration between UConn Extension and the Department of Plant Science & Landscape Architecture. The IPM Program Team acknowledges support from the following Federal, State, and private funding sources:

- Connecticut Department of Agriculture
- Connecticut Department of Energy and Environmental Protection (DEEP)
- Connecticut School IPM Coalition
- Grower donors and municipal and school grounds research participants throughout Connecticut
- Multi-state Hatch Project NE-1032
- National Plant Diagnostic Network (NPDN)
- New England Vegetable & Berry Growers’ Association
- Northeast Sustainable Agriculture Research and Education (SARE)
- Northeastern IPM Center (NEIPMC)
- The Connecticut Agricultural Experiment Station (CAES)
- The University of Connecticut
- The University of Connecticut Research Excellence Program, Office of the Vice-president for Research
- US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)
- USDA Agriculture and Food Research Initiative Education and Literacy Initiative (AFRI ELI)
- USDA Federally Recognized Tribes Extension Program (FRTEP)
- USDA National Institute of Food and Agriculture (NIFA) Beginning Farmer and Rancher Development Program (BFRDP)
- USDA NIFA Crop Protection and Pest Management (CPPM) Extension Implementation Program (EIP)
- USDA NIFA Integrated Pest Information Platform for Extension and Education (iPiPE)
- USDA Northeast Region IR-4 Program
- USDA Northeast Sustainable Agriculture Research & Education (SARE) Program
- USDA Risk Management Agency (RMA)
- USDA Specialty Crop Block Grant (SCBG) Program
- USDA Specialty Crop Research Initiative (SCRI)
- Washington State University
UConn IPM Program Team Delivers Educational Outreach

Greenhouse Biological Control Conference June 20, 2018, UConn Storrs
Workshop Organizer: Leanne Pundt, Extension Educator for Greenhouse Crops

This conference featured presentations on Developing an Effective Integrated Control Program by Michael Oleykowski, Syngenta; Biofungicides and their Fit into Your IPM Program by Debbie Palumbo-Saunders, Bioworks; Implementing Our Biological Control Program by Kerri Stafford, Head Grower, Cavicchio Greenhouses; and Top Plants for Attracting Pollinators: Natives and Beyond by Annie White, Nectar Landscape Design Studio. The conference was attended by 58 growers from CT, MA, RI, PA, NJ and NY. Of those that completed the evaluation forms, 95% rated the conference as useful to very useful, and 97% stated that they learned something to adopt a new practice. This work is supported by the Crop Protection and Pest Management Grant no. 2014-70006-22548/project accession no. 1004700 from the USDA National Institute of Food and Agriculture.

Greenhouse Biological Control Conference. Left: Kerri Stafford, Cavicchio Greenhouses discussing their biological control program; Right: Debbie Palumbo-Saunders speaking on Biofungicides.
Photos: Cora McGehee.

“Excellent range of speakers, great conference.
Always a wonderful program!”

Invasive Plant 2018 Symposium October 4, 2018, UConn Storrs
Connecticut Invasive Plant Working Group (CIPWG)
Co-chairs: Donna Ellis, Senior Extension Educator and Charlotte Pyle (retired from USDA NRCS)

The ninth biennial Connecticut Invasive Plant Working Group (CIPWG) invasive plant symposium was convened on October 4, 2018 at the UConn Student Union in Storrs, CT, with 450 people attending. The theme of the symposium was: Invasive Plants in Uncertain Times: Achieving More with Less. The conference featured national, regional, and local experts as well as citizen volunteers sharing practical solutions for invasive plant management and actions needed to promote native species and improve wildlife habitat. Keynote speaker Judy Preston, Long Island Sound Connecticut Outreach Program Coordinator, Connecticut Sea Grant, presented, “Raising the Bar on Sustainability: Transcending the Gardener.” Concurrent afternoon sessions included: Introduction to Invasive Plant Management, The Nursery Industry and Non-Invasive Alternatives, Early Detection and Invasive Plant Risk Assessment, Advanced Invasive Plant Management, Innovative Invasive Plant Technologies, and Native Alternatives – Why and How to Use Them. Research and management posters, an invasive plant identification area, and other educational exhibits were featured throughout the day. Professor Mark Brand from UConn received the Leslie J. Mehrhoff Award. Symposium information is available on the CIPWG website.
Left: Keynote speaker Judy Preston; Right: Leslie J. Mehrhoff Award recipient Mark Brand. Photos: Donna Ellis

“Excellent speakers – great symposium!”
“All so interesting …and seeing the number of people who care.”

Pest and Production Update for Greenhouse Crops – Sept 27, 2018, New Haven, CT
Program Organizer: Leanne Pundt, Extension Educator for Greenhouse Crops

This conference featured the following presentations: USDA Crop Insurance Options to Manage Farm Risk by Joe Bonelli, UConn Extension; Managing Plant Height and Greenhouse Lighting: Why, When and What by Chris Currey, Iowa State University; Eats Shoots and Leaves: Important Pests of Annuals and Perennials and Getting Into the Root Zone and When Mite Makes Blight by Dan Gilrein, Cornell Cooperative Extension of Suffolk County; and Managing the Root Zone by Rosa Raudales, University of Connecticut. The conference was attended by 50 growers from CT and MA. Of those that filled out evaluation forms: 99% rated the sessions as useful to very useful. 82% stated that they would adopt a new practice as a result of what they learned that day.

“The updates on new products, product changes and pest/disease migration are very helpful.”
“It was well done. Clean, simple and informative. Chris was awesome.”
“Thanks for a great program; I got a lot out the discussions, especially the lighting talk.”
UConn Extension’s Vegetable & Small Fruit Conference - January 8, 2018, South Windsor, CT

Mary Concklin (Chair), Joan Allen, Donna Ellis, Leanne Pundt

This annual conference, attended by 245 growers and industry members, featured 9 presentations by growers Michele & Billy Collins from Fairweather Acres, Alexandra Gross from Bishops Orchards, Bruce Gresczyk, Jr from Gresczyk Farms, Jamie Jones from Jones Family Farms, and Tim Nourse from Nourse Farms; University Extension and research members Ray Samulis from Rutgers, Andy Radin from U of Rhode Island, Christine Smart from Cornell, and Rich Cowles from the CT Agricultural Experiment Station. The trade show attracted 32 vendors featuring plants and products applicable to vegetable and fruit growing, as well as USDA, UConn and the CT Department of Agriculture.

Of those that completed the evaluation form, 95% indicated the conference was good to excellent; 88% indicated they learned something that would help them improve crop production practices or crop quality; 96% indicated they improved their understanding of pest management; and 40% indicated they implemented new practices based on information learned at the 2017 conference.

Northeast Greenhouse Conference and Expo – November 7 & 8, 2018

The biennial Northeast Greenhouse Conference & Expo has been a tradition for CT greenhouse growers and retailers to attend since 1972. This two-day educational conference and trade show was recently held on November 7 and 8, in Boxborough, MA and featured over 40 educational sessions. Over 579 attended this conference from CT, ME, MA, NH, NY, RI, VT, NJ, PA and Canada. This conference is co-sponsored by New England Floriculture, Inc. - a group of grower representatives from the Northeast, augmented by University and Cooperative Extension staff in each state who specialize in greenhouse crops and management. Leanne Pundt is chair of the publicity committee and assists the program committee.
New England Greenhouse Floriculture Guide Available at Conference

Connecticut growers have long relied on the New England Greenhouse Floriculture Guide, for its unbiased, detailed information about insects, mites, dieses, weeds, plant growth regulators and pesticide safety. It is updated every two years by faculty from New England State universities. Leanne Pundt was section editor of the Integrated Pest Management and Insect Biology Section and the Weeds, Algae and Liverworts sections.

Fruit IPM Program

Program Leader: Mary Concklin, Visiting Associate Extension Educator for Fruit Crops

Small Fruit Scouting Primer, June 13, Bishops Orchards, Guilford, CT.
Tree Fruit Scouting Primer, July 12, Norton Bros Orchards, Cheshire, CT.

Program Organizer: Mary Concklin

These 2-hour in-the-field hands-on workshops were attended by 48 growers. Every attendee received a hand lens, a tree fruit pest picture pocket guide, a small fruit pest picture guide, and a beneficial insect picture guide. They learned about the proper timing for scouting particular pests, how to scout including where to look on the plants and why, economic thresholds, the use of degree day models, and management options. One hundred percent of the attendees indicated they learned something new regarding pest scouting. All participants indicated the hand lens and pocket picture guides were beneficial in helping them identify pests.

iPIPE – CT Grape Component is a new IPM project targeting CT grape growers that will continue into 2019. iPIPE (Integrated Pest Information Platform for Extension and Education) is an information data-basing program that promotes sharing of pest observations by growers, extension staff, interns and industry members via the iPIPE website (http://pipe.zedxinc.com). A major component of this project involved hiring 2 UConn undergraduate students, Casey Lambert and Evan Lentz, who learned grape pests and effective management strategies, economic thresholds, IPM techniques, and general grape growing by scouting 14 vineyards on a weekly basis. They also uploaded their observations to the iPIPE website. The interaction with the growers was beneficial to the interns as well as the growers, and they were able to see first-hand the impact of an effective Extension program. In addition, they represented UConn and the iPIPE program at the 2018 Farm Aid Concert at the Extension booth answering IPM questions.

Funding: USDA-NIFA through NC State University.

Left: Casey and Evan setting out a BMSB trap. Center and Right: Casey and Evan at the Farm Aid.
Photos: Mary Concklin

“Walking the vines with Casey for a weekly review and status was one of the most helpful aspects of this program.”

“Having Evan here on a weekly basis helped me by being a second set of eyes, catching what I may have missed.”

Comments
One-on-One IPM training: One-on-one fruit IPM training involved two in-the-field hands-on scouting workshops attended by 48 growers plus season long training involving 6 new and experienced fruit growers with different needs and backgrounds. Participants learned about pest life cycles, scouting techniques, beneficial insects, and effective management strategies.
Funding: USDA-NIFA-CPPM, USDA-NIFA-BFRP

Mashantucket Pequot Federally Recognized Tribes Extension Program completed its first full year of training which included seed starting, transplanting vegetable seedlings, soil testing, and starting a 4-H Club. This program has hired 2 MPTN youth in a train-the-trainer program who are learning modern farming techniques they will put to use in 2019 on the tribal farm. A farm business management plan was developed over several weeks and led by Joe Bonelli, UConn Extension Business Management Educator. A vegetable course was begun and will continue into 2019 being taught by IPM team member Shuresh Ghimire.
Funding: USDA-FRTEP

MPTN youth participating in a seeds starting class.
*Photo: Mary Concklin*

Programs were held across CT to address Farm Business Risk Management. Programs involved working with partner organizations including CT Farm Bureau, CT Pomological Society, CT Greenhouse Growers Association, CT Christmas Tree Growers Association, Hops Growers Association, Tobacco growers, the CT Agricultural Experiment Station, CT Nursery and Landscape Association, the CT Department of Agriculture, as well as other UConn Extension Educators. Topics at the programs were aimed at addressing a multitude of risk factors and mitigation methods including crop insurance. In addition, we held a series of one-on-one programs where growers/farmers could meet with a specialist to address risk management topics in a confidential setting. Joseph Bonelli and Mary Concklin are in charge of this program.
Funding: USDA-RMA

Educational Programs and Outreach: I am responsible for program development at several events, which included the UConn Extension Vegetable & Small Fruit Conference, and the Connecticut Pomological Society Annual Meeting.

“Excellent training in fruit & berry production.”
*Comment, CT Pomological Society meeting*

A 4-part fruit growing webinar series was conducted in the winter of 2018 that covered mating disruption of apple pests (taught by M. Concklin and R. Cowles – CAES), the NEWA crop management tool (taught by M. Concklin), weed management in berry crops (taught by T. Besancon, Rutgers) and strategies for grape canopy management (taught by E. Petit, UMass). These were offered live and recorded for later viewing. A two-part apple pruning video was developed for beginning and experienced growers. The webinars and the video are on the UConn IPM website, http://ipm.uconn.edu/root/webinars.php
Funding: USDA-NIFA-CPPM
Greenhouse IPM Program
Program Leader: Leanne Pundt, Extension Educator for Greenhouse Crops

Greenhouse IPM – Season Long Hands-on Training 2018
Bedding plants, edibles (vegetable and herb transplants, greenhouse vegetables grown for production), ornamental herbaceous perennials and poinsettias are grown under cover in greenhouses. This diversity of crops and associated pests and diseases makes biologically based pest management challenging. Implementing biological control is complex due to multiple crops and pests, so a long learning curve among growers is common.

In 2018, 10 businesses participated in the Greenhouse IPM Program, with nine of the 10 using some type of biological controls, including biological fungicides, beneficial nematodes, and biological control agents or natural enemies.

Use of host specific parasitic wasps against whiteflies and dusting pollen, a food source for predatory mites that feed upon whitefly eggs. Photos: Leanne Pundt

“We could not have done it without you and all the wonderful help from UConn!!”
Mark Dietrich, The Garden, Woodbury, CT

“Thanks Leanne! You’re the best!”
Liz Cercarelli, Waterfield Farms, Bethany, CT

Use of habitat planters to supply alternative food source (pollen) and habitat for minute pirate bugs that prey upon thrips. Photo: L. Pundt
Eighty-nine training sessions were conducted, to wholesale and retail greenhouses with 857,500 square ft. of intensive greenhouse production and 1,254,600 square ft. of outdoor container production.

Those not participating in direct hands on training were reached via educational programs such as the Spring Bedding Plant Meetings (54 growers attended) and via diagnostic trouble shooting grower visits, phone calls, emails and texts.

**Pest Messages**

Twenty-six pest messages were sent out to 270 growers and allied members of the ornamental horticulture industry and were posted on the UConn IPM website. [http://ipm.uconn.edu/pa_greenhouse/pestMessages.php](http://ipm.uconn.edu/pa_greenhouse/pestMessages.php)

![Image](image1.png) The Garden, Woodbury CT.  
![Image](image2.png) Botrytis blight is best management by cultural and environmental controls. *Photos: L. Pundt*

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**Invasive Species IPM Program**

*Program Leader: Donna Ellis, Senior Extension Educator and IPM Coordinator*

**Invasive Plants: A Growing Concern**

IPM methods can be used to control invasive plants in residential properties, communities, and natural and managed landscapes. The Connecticut Invasive Plant Working Group (CIPWG; Donna Ellis and Charlotte Pyle, Co-Chairs) is a consortium of members of environmental organizations and affiliates of municipal and state agencies whose mission is to promote awareness of invasive plants and their non-invasive alternatives. CIPWG’s news and events list serve has approximately 860 members. The [CIPWG website](http://cipwg.uconn.edu) provides information on invasive plant identification and management, the Connecticut list of invasive plants, photos, native plant and other non-invasive alternatives, and legislative updates. CIPWG exhibits were displayed, invasive plant talks were presented, invasive plant educational materials were provided, and/or invasive plant management activities occurred at local, statewide, and regional events during 2018. A total of 652 invasive plant activities in 30 Connecticut towns reached over 23,325 Connecticut citizens, 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. In collaboration with Connecticut Agricultural Experiment Station scientists, 56,124 beneficial insects (*Rhinoncomimus latipes* weevils) were released onto invasive mile-a-minute weed (*Persicaria perfoliata*) at 49 sites in 25 Connecticut locations to date in a biological control project that began in 2009. Mile-a-minute has been confirmed in 52 Connecticut towns.

![Image](image3.png) (Left) Greenwich Inland Wetlands Agent Aleksandra Moch counts beneficial insects for mile-a-minute weed control; (Right) Mature mile-a-minute fruits. *Photos: Carole Cheah (left) and Donna Ellis (right)*
Invasive Insects: Lily Leaf Beetle
Donna Ellis continued to serve as Principal Investigator for a USDA APHIS biological control project for lily leaf beetle, a serious pest of lilies and other herbaceous ornamental plants. Ms. Ellis supervised UConn Master Gardener Coordinator Gail Reynolds, who recruited private landowners and businesses that grow or sell lilies to participate in the applied research project. Three species of lily leaf beetle biological control agents (parasitoid wasps) were introduced onto lilies during 2018, and a total of 1,600 beneficial insects have been released into 34 Connecticut sites to date. Multiple sites have been confirmed where parasitized lily leaf larvae have been confirmed in the state since the project began, indicating the gradual establishment of the parasitoids and their dispersal from release sites. An updated fact sheet and an infographic for lily leaf beetle biological control are available on the IPM website. The introduction and establishment of biological control agents to reduce populations of lily leaf beetle will provide a sustainable method of managing this important ornamental plant pest to help protect Connecticut agriculture.

Gail Reynolds releasing beneficial parasitoids. Adult lily leaf beetle. Photos: Donna Ellis

USDA APHIS Cooperative Agricultural Pest Survey (CAPS) Pest Detection Surveys
Jennifer Dacey, in collaboration with Donna Ellis, IPM Program Coordinator at UConn, and Katherine Dugas, Connecticut Agricultural Experiment Station (CAES) State Survey Coordinator, conducted the CAPS Pest Detection Surveys during 2018. Key survey objectives were to determine whether the following exotic pests were present in Connecticut high-risk areas containing prominent oak, maple, fir, spruce, and pine populations:

- Black fir sawyer, *Monochamus urussovii*
- Black spruce beetle, *Tetropium castaneum*
- Brown spruce longhorn beetle, *Tetropium fuscum*
- European hardwood ambrosia beetle, *Trypodendron domesticum*
- False codling moth, *Thaumatotibia leucotreta*
- Green oak tortrix moth, *Tortrix viridana*
- Japanese pine sawyer, *Monochamus alternatus*
- Large pine weevil, *Hyllobius abietis*
- Oak ambrosia beetle, *Platyptus quercivorus*
- Oak processionary moth, *Thaumetopoea processionea*
- Pine processionary moth, *Thaumetopoea pini*
- Pine tree lappet, *Dendrolimus sibricus*
- Siberian silk moth, *Dendrolimus pini*
- Variegated golden tortrix moth, *Archips xylosteanus*

A total of 30 trap survey sites in northeastern Connecticut, including retail/wholesale nurseries, state forests, sawmills, and Christmas tree farms, were identified in 4 counties: Hartford, New London, Tolland, and Windham. National survey guidelines and trapping protocols were followed to install selected insect traps and service them every two weeks, including lure replacement and insect collection on all survey sites. All survey sites were monitored from June to September, and no target species were identified.
Donna Ellis and Jennifer Dacey conducted full-season IPM training programs at four Connecticut wholesale nurseries during 2018. Leanne Pundt provided additional support for the program through site visits and diagnosis of plant problems. On-site, hands-on training to manage plant pests (insects, mites, weeds, and diseases) on ornamental crops was provided at Connecticut nurseries. Joan Allen from the UConn Plant Diagnostic Laboratory provided additional support with plant specimens and diagnosing disease and insect problems during the growing season. IPM participants increased their knowledge, skills, and use of IPM methods to reduce plant problems. Key priority areas were identified and addressed during each visit. Program participants benefited from the intensive on-site IPM training, which included the inspection, monitoring, and diagnosis of ornamental crops for plant pests and natural enemies, monitoring reports with management recommendations, and overall discussion on plant health care.

The UConn Nursery and Landscape Update was developed and disseminated in 2018 by Donna Ellis, Jennifer Dacey, Leanne Pundt, Victoria Wallace, and Alyssa Siegel-Miles. The Updates were disseminated to producers during the growing season and were posted on the IPM website.

“Great job, thanks!
Phil Allegretti, The Plant Group

“You are a huge asset to the horticulture industry.”
Dave Taddei, Mountainview Landscaping LLC
School IPM Program
Program Leaders: Victoria Wallace, Associate Extension Educator for Sustainable Landscapes and Donna Ellis, Senior Extension Educator and IPM Coordinator

The Connecticut School IPM Coalition was formed as the result of a statewide ban on the use of pesticides for daycare facilities and K-8 schools. Coalition members developed and presented educational workshops for school grounds and athletic field managers and their staff on maintaining grounds and fields without the use of pesticides. Assessment tools and methods to determine the impact of the management and quality of school grounds and athletic fields have been developed to better serve school grounds managers. The state of Connecticut requires the use of an IPM plan for care of all school grounds and athletic fields, even if the school managers are obligated to manage and care for these properties without the use of pesticides.

UConn IPM Program team members who were active in the Connecticut School IPM Coalition during 2018 included Victoria Wallace and Donna Ellis. A day-long educational workshop was held in Lebanon, CT on August 14, 2018, attended by 64 school and municipal employees and landscape professionals. Attendees learned about overseeding strategies, weather stations as IPM tools, irrigation system operations, white grub management, and evaluation of the three year assessments of school athletic fields and landscapes, as well as a legislative update. Pesticide credits were awarded.

Eighty-eight percent of the attendees who completed the evaluation forms stated that they were likely to incorporate some of the information learned into their existing school grounds management programs by the following growing season, and 100% rated the program as good to excellent. The respondents increased their understanding about managing school grounds without pesticides, weed control options, and Connecticut pesticide laws by 20%.

“The presentations hit on all of the right topics. It was a very good seminar. This program gets better every year.”
Rich Calarco, Parks & Recreation Director, Hebron, CT

Left: Attendees listen to a presentation (left); Right: Professor Emeritus Bill Dest presents findings of his research at a School IPM Workshop in Lebanon, CT. Photos: Alyssa Siegel-Miles

As part of Year 1 of the current IPM grant, UConn faculty have partnered with two New London County schools, Lyman High School in Lebanon, and Ledyard High School in Ledyard, CT to examine the use of biological control agents as a sustainable, non-chemical IPM method to reduce pest populations in CT school landscapes. The two locations will serve as “demonstration gardens” to teach school grounds managers, students, and teachers about biological control and the care of pollinators and other beneficial insects.

Banker plants (which support pollinators and beneficial insects) were installed to supplement existing gardens. The biological control agents Aphidoletes aphidimyza (predatory midges) and Neoseiulus fallacis (predatory mites) were released during the summer, once a sufficient number of insect pests were identified in the landscape and weather conditions were appropriate. A total of 250 midges was released on three dates at two week intervals (750 total) to
control aphids. Five thousand mites were released on two dates at four weeks intervals (10,000 total) to control spider mites.

A seasonal assistant and a volunteer installed and maintained the banker plants. V. Wallace supervised the seasonal assistant, who monitored the banker plants throughout the summer to check for problem insect pests and the populations of the introduced biological agents. Problem insect pests were found on existing plant material and surrounding weeds. Design elements common to school landscapes, such as entryways protected from wind and gardens planted in courtyards, allowed the introduced biological control agents to remain at the release sites.

A seasonal assistant inspects a landscape plant for pests and signs of insect damage. Photo: Alyssa Siegel-Miles

A UConn staff person releases *Neoseiulus fallacis*. Photo: Alyssa Siegel-Miles

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**Sustainable Landscapes Program**

*Program Leader: Victoria Wallace, Associate Extension Educator for Sustainable Landscapes*

**Alliance for Low Input Sustainable Turfgrass (ALIST) Evaluation**

Year 2 data of a 2-year evaluation trial of perennial ryegrass cultivars were collected. Year 1 data of a 2-year evaluation trial of Kentucky bluegrass cultivars trial were collected. Year 2 data will be collected during the growing season of 2019.

**ALIST evaluation, Storrs, CT.** Photo: Victoria Wallace
Workshops and Field Day
Sustainable landscape presentations were made both in-state and out-of-state. Topics included turfgrass selection, weather stations as a tool for landscape pest management, alternative lawn options for landscape professionals, and UConn research updates.

The 2018 UConn Turfgrass Field Day was held at the Plant Science and Landscape Architecture Research Facility, in Storrs, CT on July 17, 2018.

A total of 267 people, including golf course superintendents, school grounds managers, lawn care professionals, state regulatory officials, and educators attended the day-long educational program, which was hosted by the UConn Turfgrass faculty and staff. The morning program was a tour stop of ongoing research projects; the afternoon sessions included 2 workshops. Commercial industry representatives maintained exhibit booths during the event.

One hundred percent of the attendees who completed the evaluation forms stated that the information presented during the Turf Field Day would help them make more effective, efficient, and sustainable turf management decisions. One hundred percent also said the workshop would help them save money or support turf management purchasing decisions. Many stated that the information would help them reduce their use of pesticides (91%), water (93%), and fertilizer (95%). The evaluation showed that 95-100% of attendees believed information presented during the Field Day’s tour stops will help improve their turf performance. Ninety-seven percent rated the program as good to excellent. Sixty-eight percent of evaluation responders are responsible for IPM Decisions, and 62% make purchasing decisions.

“Your work with alternative weed control shows promise.”

“UConn is doing a great job of identifying current trends and initiatives in the industry. I would change nothing about the Field Day program.”

Attendees’ comments
As part of an ongoing grant project, Organic Turf and No Pesticide Turf Demonstration for Home Lawns and Athletic Fields, a day-long workshop for school grounds staff was held on September 19, 2018 in East Windsor, CT. Staff from two towns participated in the educational program, which was hosted by J. Henderson, G. Maxey and V. Wallace.

G. Maxey discusses fertilizer calibrations at the workshop.  Photo: Alyssa Siegel-Miles

Overseeding Strategies of Non-irrigated, Pesticide-free Athletic Fields (with G. Maxey and J. Henderson)
Three locations have been part of an onsite demonstration trial evaluating TWCA-approved drought tolerant cultivars and non-TWCA cultivars of three species of turfgrasses (K. Bluegrass, P. Ryegrass and, T. Fescue) overseeded on actively used athletic fields. Treatments were established in September 2016, and overseeded in Fall 2016, Spring 2017, Fall 2017, and again in Spring and Fall 2018. Data were collected for establishment and wear tolerance. Data analysis is being evaluated at this time.

Cornell “Short Cutts”
Turfgrass conference call and newsletter (33-35 weeks/year; April-October). IPM recommendations for turfgrass managers along with current research and weather forecasting were made available to Extension faculty in the Northeast.

Sustainable Landscape and School IPM Publications
Vickie Wallace and Alyssa Siegel-Miles developed 9 UConn School IPM bulletins and fact sheets during 2018, which are posted on the UConn IPM website.

Vegetable IPM Program
Program Leader: Shuresh Ghimire, Extension Educator for Commercial Vegetable Crops (Joined in 2018)

After Jude Boucher retired in June 2017, the UConn Vegetable Extension Educator position was vacant for a year, until Shuresh Ghimire was hired for this position in July 2018.

The UConn Weekly Vegetable Pest Alert, led by Joan Allen from May to mid-July, and led by Shuresh Ghimire from mid-July through September with inputs from Matt DeBacco, Mary Concklin, Donna Ellis, and Ana Legrand, was distributed to 442 subscribers via the UConn Extension Vegetable IPM Program listserv. As a part of the Federally Recognized Tribes Extension Program (FRTEP), Shuresh taught 3 classes on Basics in Vegetable Production to Mashantucket Pequot Tribal Nation.

Shuresh visited 24 unique vegetable farms in the state from July through December and is looking forward to meeting and working with more growers. One of his first goals is to prioritize the needs of Connecticut vegetable growers. His focus in 2019 will be to help vegetable growers identify problems and plan for management solutions that are IPM-based and sustainable.
Squash vine borers in field. *Photo: Shuresh Ghimire*

Black rot on cauliflower. *Photo: Shuresh Ghimire*

Sclerotinia rot on winter squash. *Photo: Yonghao Li, The Connecticut Agricultural Experiment Station*

**Vegetable Entomology**

*Program Leader: Dr. Ana Legrand, Assistant Extension Professor*

Several projects are ongoing on the use of insectary plants for conservation of beneficial insects like insect predators, parasitoids and pollinators. Many insect predators and parasitoids feed on flower nectar and pollen to meet or complement their nutritional requirements. Studies have shown that these floral resources aid in enhancing the survival and fecundity of these natural enemies who are our allies in pest management. The insectary plant project’s goal is to identify plants that can attract key natural enemies of the caterpillar pest complex (diamondback moth, imported cabbageworm, etc.) on brassica crops. Experiments evaluated *Ammi majus* as an insectary plant to attract parasitoids of cabbage caterpillar pests. In addition, field experiments also compared *Ammi majus* and buckwheat *Fagopyrum esculentum* for their attraction to hover flies, other insect natural enemies and pollinators. Dr. Legrand also collaborated with colleagues in the region to organize the Brassica Pest Collaborative with the objective to share resources, collaborate on projects and develop educational materials on insect pest management of brassica crops. Lastly, work also started in the development of a remote sensing system for potato leafhopper damage to green beans.
Benjamin Gluck, a Master’s level student in the Department of Plant Science and Landscape Architecture, continued work on a study examining drought-tolerant plants for insect pollinator and natural enemy attraction. The rationale for this study is to have information on the pollinators and natural enemies supported by plants that can withstand long drought spells expected from climate change. Insects were collected from anise hyssop *Agastache foeniculum*, yellow chamomile *Cota tinctoria*, firewheel *Gaillardia pulchella* and *Phacelia tanacetifolia*. Important natural enemies like hover flies and pollinators from several bee families were identified from samples processed from the first year of this study. *Phacelia* attracted the most hover fly species relative to the other plants and these flies comprised 43% of all insects collected from this flower. Bumble bee species (Apidae family) were commonly collected from all plants and the largest proportion at 23% was collected from yellow chamomile. Other pollinator families collected from these plants included Megachilidae, Andrenidae, Halictidae and other Apidae members like honey bees.

**Program Evaluation**

*Program Leader: Miriah Russo Kelly*

**IPM Collective Impact Assessment: Overview**

The UConn Integrated Pest Management (IPM) team sought to assess their educational outreach efforts using a collective impact assessment perspective. Thus, Dr. Kelly developed an evaluation protocol to 1) determine if universal program goals were reached and 2) identify stakeholder needs for the purpose of broad scale program improvement. Throughout the 2017-2018 program year, UConn Extension IPM program educators kept track of the stakeholders with whom they had “direct contact”. Upon providing this information to the evaluator, she combined the lists, checked them for any duplicates, and created a contact list for survey distribution via Qualtrics online data collection software.

The collective impact survey was designed in consultation with the entire IPM team, and asked a series of questions about the areas of IPM program support participants received that year, and if their attitudes, knowledge or behavior changed as a result. It also asks about what IPM issues are of most interest or need, and how they prefer to engage with IPM educational resources. Basic demographic questions were also asked. Each participant received a unique link via e-mail and data were collected September through October 2018. Of the 668 participants contacted, 161 responded, resulting in a 24% response rate. The research background, methods, and findings are being developed into a peer reviewed journal article and will be submitted for publication this year.
2018 IPM Projects


Bartholomew, C. L. *Development Team, National Pesticide Safety Education Center*. UConn Department of Extension, Pesticide Safety Education Program, with Universities of: Minnesota, Texas, Colorado and Michigan.

Bartholomew, C. L. *Editorial Team, Worker Protection Standard Train the Trainer Handler Video*. Pesticide Education Resources Collaborative. University of California, Davis and Oregon State University. US EPA OPP.

Bartholomew, C. L. *Medical Evaluation and Respirator Fit Testing for Worker Protection Standard Compliance*. UConn Department of Extension, Pesticide Safety Education Program with University of New Hampshire Extension and University of Delaware Extension.


Concklin, M. *BMSB Monitoring*. Cooperating growers: Blue Hills Orchard, Rogers Orchards, Bishop's Orchards, Belltown Orchards, Lyman Orchards, Holmberg Orchards, Buell's Orchards, Savino Vineyards, Heartstone Farm, Foster Family Farm. USDA-EIPM and USDA-NIFA-CPPM.

Concklin, M. *Demonstrating the Use and Value of Scientific Based Management Tools for Fertilizer Decisions – 4th Year Continuation*. Cooperating growers: Hopkins Vineyard, Beckett Farm, Belltown Hill Orchards, Bishops Orchards, Orchard Farm, Foster Family Farm, Fox Run Vineyard, Drazen Orchards, Dzen Bros Farm, Starberry Farm, Land of Nod, Gouveia Vineyard, Hayward Farm, Blue Hills Orchard, Burdick Rd Orchard, The Hickories, Jones Family Farm, Chestnut Hill Vineyard, Land of Nod Vineyard, Lebanon Green Vineyard, Sunset Meadow Vineyard, Applebrook Farm, Rogers Orchards, Buells Orchard, Savino Vineyards, Preston Ridge Vineyards, Heartstone Farm, Woodland Farm, Lapsley Orchards, Jos. Preli Farm & Vineyard, Rosabianca Vineyard, Hawk Ridge Vineyard. USDA-CPPM and USDA-iPiPE.


Concklin, M. *iPiPE – CT Grape Component*. Undergraduate student interns: Casey Lambert, Evan Lentz. Cooperating growers: Buells’ Orchard, Fox Run Vineyard, Preston Ridge Vineyard, Holmberg Orchards, Belltown Hill Orchards, Roses Berry Farm, Lebanon Green Vineyard, Heartstone Farm, Savino Vineyards, Jones Family Farm, Hopkins Vineyard, Sunset Meadow Vineyards, Foster Family Farm, Dzen Bros, Scantic Valley Farm, Gouveia Vineyard, Rosabianca Vineyard, Hawk Ridge Vineyard. USDA-NIFA-iPiPE.

Concklin, M, C. Lambert, E. Lentz. *Validating Blueberry and Strawberry Pest Models*. Cooperating growers: Scantic Valley Farm, Belltown Hill Orchards, Buell's Orchard, Roses Berry Farm, Jones Family Farm. Dzen Bros, Holmberg Orchards, Heartstone Farm, Roses Berry Farm, USDA-NIFA-iPiPE in cooperation with Cornell University.

Ellis, D. and G. Reynolds. *Biological Control of Lily Leaf Beetles in Connecticut*. USDA APHIS.

Ellis, D. and C. Cheah. *Biological Control of Mile-a-minute Vine*. In cooperation with The Connecticut Agricultural Experiment Station (CAES). USDA APHIS.


Ellis, D. and J. Dacey. *Cooperative Agricultural Pest Survey*. In cooperation with CAES and Connecticut producers. USDA APHIS.

Ellis, D. and J. Hsiang. *Forest Pest Outreach*. In cooperation with CAES. USDA APHIS.
Ellis, D. and A. Legrand. UConn Subcontract. An Undergraduate Integrated Pest Management (IPM) Training Program for the South and Northeast Regions. USDA AFRI ELI.


Legrand, A. Producing Cut Flowers for Profit and to Enhance Biological Control of Vegetable Pests. CT Department of Agriculture Specialty Crop Block Grant.

Legrand, A. In cooperation with the CNLA Education Committee. Spanish Program for Green Industry Employees. CNLA 2018 Winter Symposium & Expo.

Legrand, A. Vegetable IPM – Applied Research and Outreach Programs. USDA NIFA CPPM EIP.


Raudales, R., W. Elmer, and L. Pundt. Integrated Control of Root Pathogens in Hydroponic Solutions. CT Department of Agriculture Specialty Crop Block Grant.

Scheufele, S., A. Legrand, B. Sideman, F. Zaman, and D. Gilrein. Increasing Grower Adoption of Ecologically-based Pest Management Strategies to Improve Quality and Yield of Brassica Crops. NE SARE.

Wallace, V. Alliance for Low Input Sustainable Turfgrasses (ALIST) Kentucky Bluegrass Trial. UConn Extension.

Wallace, V. Alliance for Low Input Sustainable Turfgrasses (ALIST) Perennial Ryegrass Trial. UConn Extension.


Perennial plants (Astilbe) at Planters’ Choice Nursery. Photo: Donna Ellis
IPM Program Partners

A number of individuals, organizations, and groups were instrumental in the success of many IPM Program efforts. The UConn IPM Program Team is grateful for their cooperation and assistance. In addition, the IPM Program Team acknowledges the assistance of municipal staff (departments of public works, parks and recreation, conservation commissions, inland wetlands commissions, and Town Mayors/Managers/First Selectman) from many Connecticut towns.

All America Selections
Phil Alligretti, The Plant Group, Inc., North Franklin, CT
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Tim Angel, Town of Colchester, Colchester, CT
Audubon Society of Connecticut
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Nancy Barret, Scantic Farm, Somers, CT
Tom Barry, Greens Farms Academy, Westport, CT
Bartlett Arboretum, Stamford, CT
Charles Beasley, Cheshire, CT
Chip Beckett, Beckett Farm, Glastonbury, CT
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Ted Blomgren, Windflower Farm, NY
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Dina Brewster, The Hickories, Ridgefield, CT
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Andrew Calhoun, Orchard Farm, Bethany, CT
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Connecticut Association of Conservation and Inland Wetland Commissions (CACIWC)
Connecticut Botanical Society
Connecticut Conference of Municipalities
Connecticut Department of Agriculture
Connecticut Department of Energy and Environmental Protection (DEEP)
Connecticut Department of Transportation (DOT)
Connecticut Environmental Council (CTEC)
Connecticut Farm Bureau
Connecticut Greenhouse Growers Association (CGGA)
Connecticut Grounds Keepers Association (CGKA)
Connecticut Horticultural Society
Connecticut Invasive Plants Council
Connecticut Invasive Plant Working Group (CIPWG)
Connecticut Nursery and Landscape Association (CNLA)
Connecticut nursery, Christmas tree, orchard, and berry producers participating in commodity surveys
Connecticut Pomological Society
Connecticut Recreation & Parks Association (CRPA)
Connecticut River Coastal, Eastern, North Central, Northwest, and Southwest Conservation Districts
Connecticut School Building and Grounds Association
Connecticut School IPM Coalition
Connecticut Vegetable & Berry Growers’ Association
Silvio O. Conte National Fish & Wildlife Refuge
John Cordes, Fox Run Vineyard, Brooklyn, CT
Cornell University and Cornell Cooperative Extension
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Sharon and Tom Muska, Applebrook Farm, Broad Brook, CT
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New England Invasive Plant Group
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New England Vegetable & Berry Growers’ Association
New England Vegetable & Fruit Conference Steering Committee
New England Vegetable Management Guide Editing Committee
New Jersey Department of Agriculture
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Dr. Charlotte Pyle, retired from USDA NRCS
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Raspberries growing at a Connecticut farm.

Photo: Mary Concklin