Connecticut
Integrated Pest Management Program
2020 Annual Report

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CONNECTICUT INTEGRATED PEST MANAGEMENT PROGRAM
2020 Annual Report

Introduction

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 crop management and 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 cultural practices to mitigate pest problems, of biological control agents, and educating pesticide users about bee and other pollinator safe materials, least toxic options, and the safe use and handling of organic and synthetic pesticide products. The 2020 IPM Program Team included Mary Concklin (fruit and IPM Coordinator), Leanne Pundt (greenhouse), Victoria Wallace (school, invasive, pollinators, turf and landscape), Jacob Ricker (nursery), Ana Legrand (vegetables), Shuresh Ghimire (vegetables), Abby Beissinger (diagnostician, resigned August 2020), Miriah Kelly (program evaluation, resigned August 2020) and Candace Bartholomew (pesticide safety education, retired fall 2020).

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 organic and synthetic 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.

COVID-19 impacted many outreach programs usually conducted face-to-face. However, our team members quickly adapted and offered many programs virtually, while others have been postponed until 2021 and 2022. In 2020 pre-COVID-19 and in “normal” years, 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 and text, site visits to their operations, workshops, field demonstrations and research projects, 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.

**IPM Outcomes**

- There were 114,737 sessions created by 99,725 users of the IPM website (www.ipm.uconn.edu) during 2020, representing 145,137 page views.

- Vegetable integrated pest management education was delivered to over 600 vegetable growers and stakeholders every week from May to September 2020 through 19 weekly vegetable pest alerts focusing on pests, pest management and decision making, and safe pesticide use.

- In spring of 2020, our Vegetable Extension Program launched an online Vegetable Production Certificate course for the first time with an objective to effectively deliver information to beginner vegetable producers, especially when in-person interactions are limited. The course had seven online modules, each module with a self-paced video, supplemental materials, and a short quiz. In the post-course evaluation survey (total number of course participants = 23), respondents indicated on average 34% increase in their knowledge from the course.

- Over 400 invasive plant activities occurred in over 50 Connecticut towns, reaching over 8,700 Connecticut citizens in 2020, including agency and municipal staff. A minimum of 13,406 hours of intensive invasive plant training sessions and management activities was provided, as well as technical educational outreach.

- School and municipal grounds managers, nursery managers, and landscape professionals from 169 CT towns received 10 emails with information, educational materials, and best management practices, and a survey regarding the impact of COVID-19 on their management practices was completed.

- CT Invasive Plant Working Group biennial symposium, Realistic Solutions to Managing Invasive Plants, was delivered to 386 people, including grounds managers, landscape professionals, town conservation commission members, educators, master gardeners, arborists, and government officials.

- 482 fruit growers and industry members received 104 fruit messages covering pest information, management strategies, cultural practices, meetings and educational programming updates.

**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 Farm Bureau
- Connecticut School IPM Coalition
- Connecticut Veterinary Medical Association
- Grower donors and municipal and school grounds research participants throughout Connecticut
- Indian Land Tenure Foundation (ILTF)
- Multi-state Hatch Project NE-1032
- National Plant Diagnostic Network (NPDN)
- New England Vegetable & Berry Growers’ Association
- Northeastern IPM Center (NEIPMC)
- Northeast Organic Farming Association of Connecticut (NOFA)
- Northeast Sustainable Agriculture Research and Education Program (SARE)
Victoria Wallace received the Dr. William H. Daniel Award at the Sports Turf Manager Association’s (STMA) 31st Annual Conference and Exhibition. The event took place January 13-16, 2020 at the Palm Beach County Convention Center in West Palm Beach, Florida.

Wallace is a UConn Extension educator responsible for the Sustainable Turf and Landscape Program focused toward turf and landscape professionals in the state. She is involved with integrated pest management education and outreach programs for landscape professionals and municipal turf and grounds managers.

The Dr. William Daniel Award is one of four Founders Awards, which are STMA’s highest honors and recognize those members who have made significant contributions to STMA and to the profession. The Daniel Award recognizes an individual who has made significant contributions to the industry through research, teaching or extension.
UConn IPM Program Team Delivers Educational Outreach


Organizers: Victoria Wallace, Extension Educator and UConn Liaison to CIPWG, and members of the CIPWG planning committee

The 2020 biennial symposium was attended virtually by 386 people. The symposium theme was Realistic Solutions to Managing Invasive Plants. While the program was presented in a different format due to COVID-19, the virtual program was well received and was successfully implemented. The all-day event featured 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. Pesticide credits were awarded. Symposium information is available on the CIPWG website.

This conference featured presentations on:

- **Large Scale Management** (Managing Large Parcels of Land: A Case Study), by David Gumbart, Director of Land Management, The Nature Conservancy and Chris Polatin, Restoration Ecologist, Land Stewardship, Inc.;
- **Native Alternatives** (Enhancing Habitat for Wildlife, Production of Local Ecotypes of Native Plants), by Charlotte Pyle, CIPWG Co-Chair, Darryl Newman, Principal, Planter’s Choice Wholesale Nursery, and Peter Picone, Wildlife Biologist, State of CT DEEP Wildlife Division;
- **Aquatic Invasives** (Hydrilla, Phragmites australis), by Greg Bugbee, Associate Scientist, Connecticut Agricultural Experiment Station and David Wong, Environmental Analyst, Massachusetts Department of Environmental Protection;
- **Tools & Timing of Invasive Plant Management** (Chemical Tools, Manual and Non-Synthetic Control, Drones to Map and Monitor Water Chestnut), by Randy Prostak, UMass Extension Weed Specialist, UMass Amherst, Michael Bald, Founder, Owner, Got Weeds?, and Joshua Tracy, Invasive Species Management Technician, South Central Connecticut Regional Water Authority;
- **Small Scale Management** (Reclaiming Meadows, Managing Mugwort and Reed Canarygrass), by Kathleen Connolly, Landscape Designer, Speaking of Landscapes, LLC, Lydia Pan, President, Wild Ones Mountain Laurel Chapter, Michael Nadeau, Ecological Landcare Consultant, Wholistic Landcare Consulting, LLC;
- **How to be Heard by Your Legislator**: Moving your Ideas into Law, by Patricia Wilson Pheanious, State Representative, 53rd District, and more.

98.5% of attendees stated that they are likely to incorporate the information presented during the symposium into their occupation/invasive plant management efforts. 89% of attendees who completed the evaluation forms rated the program as good to excellent. 96% felt that the presenters were knowledgeable about the subject matter and 84% of attendees stated that the symposium was well organized. 90% agreed that the symposium provided practical ideas for addressing invasive plant issues. 57% found the virtual symposium to be as valuable as an in-person conference; many appreciated the convenience, lack of commute, the option to "rewind" and review, and time efficiency. However, the other 43% preferred in-person programs, primarily because they missed the interpersonal connections and networking.

*Left*: Darryl Newman, Peter Picone, Charlotte Pyle, Rose Hiskses discuss native alternatives.

*Right*: Emmett Varricchio, Michael Nadeau, Kathleen Connolly, Lydia Pan discuss small scale management
UConn’s Cut Flower Growers Workshop.
January 14, 2020. Maneeley’s Conference Center, South Windsor, CT
Organizer: Mary Concklin, Extension Educator

The second annual Cut Flower Growers Workshop was held with 113 in attendance. This workshop, for experienced growers, beginning growers, as well as those interested in pursuing this crop, covered seven topics

- **Digging into Dahlias.** Tania Cubberly, Skyfall Flowers, Winslow, ME
- **Do You Want To Get Into The Business?** Kristen Terry, Goldust Gardens, Milford, CT
- **CT Cut Flower Collective.** Kate Brunson, Maple & Mum, Branford, CT,
- **Succession planting.** Haley Billipp, Eddy Farm, Newington, CT
- **Marketing Part 1 - Farmers Markets & CSAs.** Elise Cusano, Four Root Farm, East Haddam, CT
- **Marketing Part 2 - Weddings & Events.** Kate Brunson; Michael Russo, Trout Lily Farm, Guilford, CT
- **Leave No Flower Behind.** Tania Cubberly, Skyfall Flowers, Winslow, ME
- **Risk Management.** Joe Bonelli, UConn Farm Risk Management and Business Extension Educator

Fifty-five attendees responded to the evaluation with 98% indicating this was an excellent conference.

This was AWESOME! Thank you so much for offering this workshop. I’ll come to everyone you put on – so helpful.

Very valuable to hear from fellow farmers as well as designers and to learn what they want!

I really enjoyed the wide range of detailed and concise information from Eddy Farm. I also enjoyed hearing from someone in the beginning stages of flower farming.
This annual conference, attended by 264 growers and industry members, featured 9 topics and speakers including:

- **Niche Crops: Summer fallow that builds healthy soils, smothers annual weeds & nets cash income as high value pea shoots.** Eero Ruuttila
- **Maximize production, efficiency & SWD Control with Bramble Pruning Strategies.** Laura McDermott, Cornell
- **Integration of Cover Crops into Vegetable Production Systems.** Rebecca Brown, URI
- **Using Trellising to Help Manage Bramble Plantings.** Laura McDermott, Cornell
- **Understanding Growing Hemp.** Peter Armondo, Controlled Environment Agriculture, Griffin Greenhouse
- **Alternative Bird Control Method: SonicNets.** Sam McClintock, Midstream Technology
- **Niche Crops: Mushrooms.** Ken Metz, Chatfield Hollow Farms;
- **Mammal Control in Berries & Vegetables: 2 and 4 Legged.** Scott Williams. CAES
- **Niche Crops: Growing and Marketing Ginger.** Rachel Berg and Elise Cusano, Four Root Farm.

The trade show attracted 36 vendors featuring plants and products applicable to vegetable and fruit growing, as well as USDA agencies, UConn and the CT Department of Agriculture.

70 attendees completed the evaluation form - 90% indicated they learned something that would help their business.

**Very good conference. All speakers were excellent.**

**Helpful and informative for a new/beginning farmer. Thank you.**

**Greenhouse IPM**

*Program Leader: Leanne Pundt, Extension Educator*

**UConn Greenhouse Pest Messages**

24 greenhouse pest messages focusing on pest and disease issues, biological controls and IPM decision making were sent out via email to 280 growers, retailers and allied members of the greenhouse ornamental horticulture industry and posted on the UConn Greenhouse IPM website under pest messages. [http://ipm.uconn.edu/pa_greenhouse/pestMessages.php](http://ipm.uconn.edu/pa_greenhouse/pestMessages.php)

**Bedding Plants – Spring 2020.** Statewide program, held in two locations, on Feb 7th in Vernon, CT and Feb 11th in Torrington, CT.

Speakers included Dr. Rosa Raudales, Greenhouse Extension Specialist, UConn; Dr. Yonghao Li, plant pathologist from CAES; Abby Beissinger, Plant Pathologist, UConn Plant Diagnostic Laboratory, Candace Bartholomew, Pesticide Safety Educator, UConn Extension; and Leanne Pundt, Extension Educator, UConn Extension. 61 attended.

Of those that filled out evaluation forms, 100 % rated the conference as useful to very useful, 97 % were very or moderately likely to adopt a new practice as a result of attending these programs.

**I liked the way this class was done, I enjoyed how Rosa used FAQ and how Leanne went over what to look for in the upcoming season.**

**Great Job! Thanks for presenting up-to-date relevant topics that growers can relate to.**

**Thank you, always well put together and informative.**
IPM Scouting Tips for Herbaceous Perennials
International Intern Training, June 24, 2020, Casertano Greenhouse, Wallingford, CT. 5 interns attended.

Greenhouse Biological Control Conference
Due to COV-19 restrictions, the Greenhouse Biological Control Conference scheduled for June 23, 2020 was not held. The Jones Auditorium at CAES was also not available for meetings. Proposed speakers were contacted and informed of this decision.

Season Long Hands-on Training 2020
58 site visits were conducted when requested by growers (number was reduced due to COVID). Growers were reached via phone calls, email and text messages in response to their questions and concerns.
Additional Greenhouse Programming: Pundt wrote three trade journal articles, three *Crop Talk Newsletter* articles, twenty-two factsheets, and was editor of the 2021-2022 *New England Greenhouse Floriculture Guide*


**Vegetable IPM Program**

*Program Leader: Shuresh Ghimire, Assistant Extension Educator*

**Weekly Vegetable Pest Alert**

Weekly vegetable pest alerts focusing on pests, pest management and decision making, and safe pesticide use were delivered to over 600 subscribers via the UConn Extension Vegetable IPM Program listserv from May to September 2020. Starting in mid-July, the vegetable pest alerts were also available in Spanish. These pest alerts are also posted on UConn IPM website [Vegetable Pest Messages](http://negfg.uconn.edu/).

“Thanks to your advice this past June we saved our garlic crop (most of it) from white rot.”
Grower comment.

Stink bug feeding damage on tomatoes
*Photos: S. Ghimire*

Colorado potato beetle larvae
*Photo: S. Ghimire*
Vegetable Production Certificate Course
In spring of 2020, our Vegetable Program launched an online Vegetable Production Certificate course for the first time with an objective to effectively deliver information to beginner vegetable producers, especially when in-person interactions are limited. The course had seven online modules, each module with a self-paced video, supplemental materials, and a short quiz. This course was designed to benefit beginner vegetable producers with 0-3 years of vegetable growing experience or no formal training in agriculture. The participants learned answers to the basic questions about farm business planning, planning and preparing for vegetable farming, warm and cool-season vegetable production techniques, season extension, identification of biotic and abiotic issues, and marketing. In the post-course evaluation survey (total number of course participants = 23), respondents indicated an average 34% increase in their knowledge from the course.

Mashantucket Pequot Federally Recognized Tribes Extension Program
The Mashantucket Pequot Tribal Nation and UConn Extension have been collaborating thanks to a USDA Federally Recognized Tribes Extension Program to enhance agricultural production, food security, and health of tribal community members. An Extension program involving several specialists in vegetable and fruit production, farm business management, marketing, youth development, health and nutrition, communications, evaluation and assessment is working with the MPTN on their goals. The major outcomes of the project in 2020 are listed below:

- Increased diversity of crops and production at the MPTN farm.
- Improved consumption of locally grown produce by the MPTN community members.
- Improved marketability and increased revenue from farm produce. The revenue from the farm produce increased from $2,600 in 2019 to $5,500 in 2020.
- Improved the storage capacity and marketability of the farm produce.
- Utilized more tools of integrated pest management compared to previous years.
- The MPTN farm is now better equipped to continue production and expand the farm compared to previous years.
- MPTN farm products are being sold at local supermarkets.

Michael Puglisi and Erica Benvenuti, EFNEP-NLC make the Three Sisters recipe with members of the Mashantucket Pequot Tribal Nation.
*Photo: Shuresh Ghimire*
UConn Team Members: Shuresh Ghimire (April 2019-present), Mary Concklin (2017-April 2019), Joseph Bonelli, Miriah Kelly (2017-August 2020), and Michael Puglisi. Funding: USDA-FRTEP

Soil-biodegradable plastic mulch professional development training

UConn Extension partnered with Washington State University and University of Tennessee to organize the soil-biodegradable plastic mulch professional development trainings to educate extension personnel, industry representatives, and other agricultural service providers regarding soil-biodegradable plastic mulch so they can provide this information to growers. Two professional development trainings were held for agriculture professionals in northeastern US, and for members of the American Society for Horticultural Science (ASHS). All participants found the training to be informative. In the northeastern US webinar, 27% of participants felt they learned a lot from the training session and 41% learned some new information (N = 58, n = 38). In the ASHS webinar, 48% of participants learned a lot from the training session and 48% of participants learned some new information (N = 30, n = 21).

Hemp Growers Conference and Trade Show

Feb 26, 2020, Maneeley’s Conference Center, South Windsor, CT

In February of 2020, UConn Extension partnered with USDA NRCS and CT Resource Conservation and Development to organize the Connecticut Hemp Conference and Trade Show. The goal of the conference was to bring together farmers, agricultural suppliers, and regulatory agencies interested in the hemp industry. The conference covered healthy soils practices, local policy and regulations, Connecticut field trial results, as well as innovative production markets. The speakers from UConn included Candace Bartholomew, Chris Perkins, Gerry Berkowitz, and Jessica Lubell-Brand. The event was a valuable resource for local producers and farmers seeking connections in the state as well as knowledge about local issues and opportunities.
The meeting was attended by 255 current and prospective hemp growers and 32 vendors. Thirty-one participants (12%) completed the evaluation form. Of those that completed the evaluation forms, 82% rated Excellent or Good for the amount of new information they learned at the conference.

Participants at the Hemp Growers Conference and Trade Show on February 26, 2020 at Maneley’s Conference Center, South Windsor, CT
Photos: Shuresh Ghimire

Fruit IPM
Program Leader: Mary Concklin, Extension Educator and IPM Coordinator

Drone Imagery for Early Detection of Fruit Crop Nutritional Deficiencies
This project is working with Belltown Hill Orchards, S. Glastonbury; Blue Hills Orchard, Wallingford; and Rogers Orchards, Southington to identify and quantify nutrient deficiencies in perennial fruit crops (grapes, blueberries, apples and peaches) using drone imagery with the goal of making necessary nutrient corrections in time to impact the present crop. Year one involved drone flights four times at each farm and at several blocks per farm. This data was used to establish base line data. Tissue and soil samples were analyzed to use in conjunction because they have established standards which aids in identifying deficiencies based on color. Year two will involve a greater number of flights, rapid results and recommendations to participating growers.
Funding: USDA SCBG through the CT. Department of Agriculture

Farmer Stress Management
A website has been developed in 2019 and updated in 2020 with information for the farming community (http://ctfarmrisk.extension.uconn.edu/farmer-stress-support-resources/). A face-to-face workshop was planned and cancelled due to COVID-19.

This was a collaborative effort of UConn Department of Extension and Department of Plant Science & LA, USDA-RMA, CT Department of Agriculture, CT Farm Bureau, Farm Credit East, CT Veterinary Medical Association and CT NOFA. UConn Team Members: Mary Concklin, Joseph Bonelli, MacKenzie White, Nancy Barrett.

Funding: UConn Dept of Extension, USDA-RMA, CT Farm Bureau, Farm Credit East, CT NOFA, CT Veterinary Medical Association, and Tufts Veterinary Field Service, USDA-NIFA-FRSAN

One-on-One IPM training: One-on-one fruit IPM training was limited in 2020 due to COVID-19. Site visits were limited to emergency grower requests. Regular trap monitoring was conducted for invasive insects, Brown Marmorated Stinkbug and Spotted Wing Drosophila at 8 fruit farms throughout the entire season, and the information was included in Fruit IPM e-newsletters along with other pertinent cultural and IPM recommendation.
Funding: USDA-NIFA-CPPM
**Fruit Message:** 116 fruit messages were emailed to 474 fruit growers and industry members in 2019 covering pest information, management strategies, cultural practices, meetings and educational programs. Most of the messages are available at the IPM website (http://ipm.uconn.edu).

**Additional Fruit Programming:** Concklin updated the *New England Tree Fruit Management Guide* (stone fruit sections) and the *New England Small Fruit Management Guide* (Bramble section); authored three articles for the *Crop Talk Newsletter*; authored *Frost Protection for Fruit Crops in the Northeast* publication.

She hosted a live grower webinar discussion of PYO and Farmstand/Marketing adjustments due to COVID-19. April 23, 2020. Additional speakers included Bryan Hurlburt, Commissioner, CT Dept. of Agriculture, and Joan Nichols, Director, CT Farm Bureau. 87 participants.

Concklin made presentations: *Sustainable Edible Landscapes* (CT Nursery & Landscape 2020 Annual Winter Conference), *Pruning ornamental and fruit trees and bushes* (Yale School of Forestry), *Small Scale Fruit Production: Small Fruit* (Beginning Farmer Solid Ground training); *Impacts of Climate Change on the Farm* (The Greater Hartford Garden Club)

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**Invasive Species IPM Program**

*Program Leader: Victoria Wallace, Extension Educator*

**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) 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 1050 members. The [CIPWG website](http://cipwg.org) 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 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 2020. A minimum of 400 invasive plant activities in over 50 Connecticut towns reached over 8,700 Connecticut citizens, including agency and municipal staff. A minimum of 13,406 hours of intensive invasive plant training sessions and management activities was provided, as well as technical educational outreach.

**Invasive Biological Control Projects: Swallow-wort**

Victoria Wallace serves as the Principal Investigator for a USDA APHIS biological control project of swallow-wort, a serious invasive weed of meadows, pastures, roadsides, woodland edges and coastal shorelines. Ms. Wallace supervised UConn Master Gardener Coordinator Gail Reynolds, who recruited private landowners to participate in the applied research project. One species of moth (*Hypena opulenta*) was introduced as a biological control agent onto dense monocultures of swallow-wort in 2020, during the first year of the biocontrol project in CT. A new fact sheet and an infographic for swallow-wort biological control are available on the [IPM website](http://ipm.uconn.edu). The introduction and establishment of biological control agents to reduce populations of swallow-wort in CT provide a sustainable method of managing this invasive pest in open spaces throughout Connecticut.

*Hypena opulenta* moths were released in an area infested with swallow-wort. (Left photo)

Damage from the beneficial insects is evident on these swallow-wort plants. (Right photo)

*Photos: Gail Reynolds*
School IPM Program
Program Leader: Victoria Wallace, Extension Educator

The Connecticut School IPM Coalition was formed to support School and Municipal Grounds Managers with turf care and landscape practices following the statewide ban of pesticides on daycare and K-8 school properties. Coalition members annually develop and present in-person 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.

A day-long School IPM educational workshop was planned for August 2020, but was cancelled due to COVID-19. However, UConn IPM Program team members Victoria Wallace and Alyssa Siegel-Miles continued to produce Extension documents that benefit school ground managers. Also, the UConn turfgrass faculty developed and presented a virtual field day on August 18, highlighting turfgrass research that would be valuable to school grounds managers and other turfgrass professionals in CT. Research presentations included: strategies to enhance bio-fungicides that reduce turfgrass disease; effect of turfgrass species, seeding rate, and mowing height on weed populations during and post turfgrass establishment; low input turfgrass evaluation trials; and Solvita tests to guide N fertilization. 96 people attended the webinar. Pesticide credits were awarded.

100% of the attendees who completed the evaluation after the virtual event felt that the content of the research presentation was relevant to turfgrass maintenance programs. 100% of the attendees rated the program good to excellent.

Left: Victoria Wallace, John Inguagiato, Jason Henderson, and Tyler Seidel take part in a question and answer session during a virtual presentation.

Thank you! It was very good and more interesting than in-person field days, as they do not allow you to get an overhead look at the research projects.

Well done, well presented and worth the time staring at a computer screen. Was good to see actual footage of what was being discussed.

Very informative, to the point, and insightful. You have set the bar pretty high for the rest of the virtual programs.

2020 Turf Field Day Workshop Attendee Comments

A survey was developed and distributed in the fall of 2020 to CT grounds managers and staff to better understand the impact of COVID-19 on turf and grounds maintenance practices performed by school grounds managers and how best to deliver extension support. UConn faculty also sought to determine and identify changes to the educational and technical support needed as a result of COVID-19.
Survey results indicated that 100% of respondents were considered essential employees during the pandemic; 24% of respondents experienced staffing levels that were normal for the season, while 73% of respondents had a percentage of their staff furloughed or working mandatory reduced or modified hours. 45% reported that staffing changes/loss of staff impacted the maintenance of their municipal/school properties, while 55% reported that there was no impact. 35% stated that staff hours have been staggered so fewer staff are working at one time or that some staff duties have been redirected to disinfecting, sanitizing, or other duties not related to turf/grounds care. Of the respondents who experienced reductions in staff hours, 18% had adjusted maintenance practices by re-directing care to only heavily used fields or higher profile locations, while 37% had altered their mowing, fertilizer, and/or overseeding schedules. 25% of respondents reported that they had been able to complete normal maintenance in the spring 2020, but planned projects for fall 2020/spring 2021 or new equipment purchases were put on hold. 58% of respondents have already experienced or expect to experience future budget cuts as a result of the pandemic.

**Sustainable Landscapes Program**

*Program Leader: Victoria Wallace, Extension Educator*

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

Year 3 data of a 3-year evaluation trial of Kentucky bluegrass cultivars trial were collected. UConn is an evaluation location for this national program. Turf quality of the Kentucky bluegrass cultivars were evaluated based on reduced water, chemical and fertility inputs. Selection of sustainable turfgrass varieties is important for a turfgrass manager who must manage school athletic fields with a limited budget and few tools. Integrating varieties that perform well with fewer inputs is a critical tool for school grounds managers of K-8 fields.

![ALIST evaluation, Storrs, CT (left). Photo: Victoria Wallace.](image)

V. Wallace speaks about the ALIST turf research plots during the virtual field day program (right). Photo: Alyssa Siegel-Miles.

**National Turfgrass Evaluation Program- Tall Fescue Test**

Year 2 data of a 5-year evaluation trial of turf-type tall fescue cultivars. UConn serves as an evaluation location for this national turfgrass evaluation program.

![The NTEP turf research plots, as captured via drone during the virtual field day program.](image)
Conference Programs
Sustainable landscape presentations were conducted (nationally, regionally and in state) before COVID restricted travel. Presentation topics included integrating assessments into school grounds programs, turfgrass selection for a sustainable landscape, and UConn research updates.

Cornell “Short Cutts”
V. Wallace serves as UConn representative for a regional turfgrass conference call and newsletter (33-35 weeks/year; April-October), hosted by Cornell Extension faculty. 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 16 UConn School IPM bulletins and fact sheets during 2020, which are posted on the UConn IPM website.

Landscape Messages and Documents for Landscape Professionals:
- Biological Pest Control for CT Landscapes. February 2020 Nursery and Landscape Update. With Jacob Ricker. 4 pp.

School Grounds Managers:

Invasive Plant Documents:

Nursery IPM
Program Leaders: Mary Concklin, Extension Educator and IPM Coordinator; Victoria Wallace, Extension Educator; Jacob Ricker, Public Service Technician

Nursery site visits were conducted by Jacob Ricker at eight nurseries including email reports with feedback. Ricker reached out to nursery growers for a needs assessment in which 12 nurseries responded with feedback. Victoria Wallace worked with CT Nursery & Landscape Association (CNLA) to develop the 2020 annual conference program. Dr. Ana Legrand collaborated with CNLA to organize and moderate the Spanish Program for the 2020 CNLA Winter Symposium.

Jacob Ricker, Victoria Wallace, and Alyssa Siegel-Miles authored 3 UConn Nursery and Landscape Updates that were sent to 68 nursery growers and 450 landscape professionals, and are available on the IPM website (http://ipm.uconn.edu):
- Pruning Recommendations and Guidelines. March 2020
- Weed Management for Connecticut Nurseries and Landscapes. May 2020
- Biological Pest Control in Nursery Production and Landscape Management. February 2020

Four nursery and landscape articles, plus one newsletter were translated from English to Spanish by Ivette Lopez:
In collaboration with the UConn Home & Garden Education Center, 507 samples were processed during 2020. Samples submitted included fruit and vegetable, nursery, and greenhouse (both ornamental and vegetable) crops, and were accepted from both home garden and commercial clients. Samples came from 111 Connecticut towns, as well as Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, and Rhode Island. Diagnostic services included plant and insect identification, plant disease diagnosis, and abiotic disorder diagnosis. Image sample submissions to the Plant Sample Submission App were used by both professional and home garden clients. Fees of $20.00 per sample were covered by a USDA NIFA CPPM grant for 55 samples from Connecticut commercial growers. Monthly diagnostic summary reports were sent to 95 plant pathologists, diagnosticians, administrators, and interested growers in the region.

The lab was approved by the CT Department of Agriculture to accept hemp leaves, stalks, and stems for diagnostic purposes. Flowers can be accepted only if they have undergone THC testing. Hemp testing was a new service offered to growers beginning summer 2020.

A new hot water seed treatment was launched to support growers and home gardeners in the region, in partnership with UConn Extension Vegetable Specialist, Shuresh Ghimire.

Beissinger made five diagnostic videos, wrote nine articles and blog posts, and presented at eleven workshops.

The UConn Plant Diagnostic Lab is part of the National Plant Diagnostic Network, a Department of Homeland Security funded network of diagnostic labs throughout the country. During 2020, Beissinger regularly collaborated with diagnostic labs and diagnosticians to help solve difficult plant health issues. Abby Beissinger left UConn in August 2020. The program was covered by Matt DeBaco on a part-time basis through the rest of the 2020.

**Program Evaluation**

**Program Leader: Miriah Kelly**

**IPM Collective Impact Assessment: Overview**

In March 2020 the Covid-19 pandemic caused the temporary closure of facilities, and prevented IPM team members from providing hands-on IPM support throughout the growing season, as would be done in a typical programming year. Given this disruption, the IPM team adapted and provided the allowable programming they could during this time. To better understand the impact of Covid-19 on current and future IPM programming, the team developed and implemented a brief
survey using Qualtrics Online data collection software. Given the limitations of this year, the 2019 contact list was used to distribute the survey to participants via e-mail. In December 2020, 1060 digital surveys were sent to possible participants from around the state, and 114 individuals responded, resulting in a response rate of 11%. Basic descriptive statistics were run for quantitative variables, and thematic coding was completed for qualitative variables.

The vast majority of participants responded "none" when asked about current concerns regarding their ability to use IPM strategies to manage pests amid COVID-19 pandemic. Other concerns cited include: limitations on farm visits, volunteer gatherings, and being able to work "on-site". Additional concerns include lack of labor, time, and access to resources (i.e. delivery delays), especially others in their community/field. Also noted is a concern about the impact of the pandemic on public willingness to have individuals on their property to conduct IPM management practices.

The vast majority of respondents indicated that there are no new topics of interest due to the COVID-19 pandemic. Others wrote that the following topics might be considered: No-chemical use IPM approaches, using drones for IPM, use of biocontrol measures, and use of Growing Degree Days (GDD).

Most participants indicated that there was no change to their IPM practices as a result of Covid-19. Several participants indicated that they are conducting more scouting and monitoring. Others in the turf management field noted that there is less wear on fields making them easier to manage. Expectedly, some reported that there are, in general, a shrinking of efforts due to interaction limitations and fewer staff overall. Others wrote that they were more focused on Covid-19 and less on IPM, and that they had to pre-plan for use of alternative methods (chemicals) if IPM beneficial insect options were not available.

Although many participants indicated that Covid-19 has not greatly affected their IPM practices, these findings show that some have been impacted by these changes, to varying degrees. There are some concerns expressed by participants that should be considered, as well as emergent topics participants presented that might be integrated into future programming. Lastly, the findings show that some have made changes to IPM practices as a result of Covid-19. The changing conditions resulting from the Covid-19 pandemic are important to recognize in the development and implementation of future IPM education, outreach, and engagement efforts.

**Vegetable Entomology**

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

**Brassica Pest Collaborative**

The Brassica Pest Collaborative continued its work by organizing a number of educational activities. These activities were mostly online due to the COVID-19 pandemic. Research activity continued when it was possible to restart campus activities.

**Potato Leafhopper Monitoring & Remote Sensing Project**

Dr. Legrand’s lab focused on the development of a remote sensing system for monitoring potato leafhopper (PLH) damage to green beans. This project is done in collaboration with Dr. Witharana from the Dept. of Natural Resources and Environment at UConn. PLH is a significant pest in several horticultural systems and this work has the potential to benefit multiple commodities through early detection of the insect with minimal labor inputs by growers. Mr. Bivek Bhusal, master’s level student in the lab, was able to do field work and greenhouse experiments for this project. He completed evaluations of bean plant responses to PLH feeding correlating them to leaf reflectance measurements. The information collected will guide the design of bean canopy reflectance analysis from imagery captured using a drone equipped with a spectral sensor. The ultimate goal is to detect PLH feeding quickly from field images taken by a drone.

*Potato leafhopper on green beans.*

*Photo: Ana Legrand*
Asiatic Garden Beetle Plant Preferences
In addition to PLH research, lab members studied other insect pests such as the Asiatic garden beetle (AGB). Ms. Kaelin Smith, Sustainable Plant and Soils Systems major, was able to complete her research season evaluating AGB feeding preferences on basil cultivars and selected ornamental plants. AGB is a scarab beetle that can totally defoliate preferred host plants and is a common problem for Connecticut residents and growers.

Lastly, Dr. Legrand began work on a new lab website to disseminate information from the entomology research done by lab members. Mr. Ryan Morais, UConn Extension Summer intern, greatly advanced the work on the website design and development.

Pesticide Safety Education
Program Leader: Candace Bartholomew

Turf and Ornamental Short Course
This Short Course is an in depth review of the information necessary for studying and fulfilling the requirements of the Ornamental and Turf/Golf Course Superintendents State of Connecticut Supervisory Pesticide Applicator Certification exam. A student completing all the modules, working through the quizzes, and studying resources materials independently should be able to successfully pass the examination, both written and oral state exam. Class topics are: Pesticide Laws and Regulations, Pesticide Safety, Botany and Ornamental Identification, Plant Pathology and Ornamental Plant Diseases, Entomology and Insect Pests of Woody Ornamentals, Area and Dosage Calculations, Turf Management and Weed Management. Each class begins with a basic overview of the science then takes an in-depth look at specific pests, their biology and control. We have developed the course into 8 modules. Instructors included: Victoria Wallace, Abby Beissinger, Rob Durgy (CT Agricultural Experiment Station), Candace Bartholomew.
Other Outreach
IPM team members provided pesticide safety education and pesticide updates at the UConn Vegetable and Small Fruit Conference, UConn’s Cut Flower Growers Workshop, CT Nursery & Landscape winter conference, Beginning Farmer Solid Ground trainings, MA Cultivated Blueberry Association workshop, UConn Turf Field day, Hemp Growers conference, one-on-one site visits, phone calls, text messages, newsletters, and factsheets.

2020 IPM Projects


Beissinger, A. and S. Ghimire. Hot water seed treatment training and service for growers. CES grant for Innovative Programming in Extension, UConn


Concklin, M. *Drone Imagery for Early Detection of Fruit Crop Nutritional Deficiencies.* Evan Lentz and Nancy Marek, graduate students; Dr. Chandi Witharana and Dept. of Natural Resources and Environment, UConn. USDA SCBG

Concklin, M. *BMSB Monitoring.* Cooperating growers: Belltown Orchards, Blue Hills Orchard, Hickory Hill Orchard, Rogers Orchards. USDA-EIPM and USDA-NIFA-CPPM.

Concklin, M. *Fruit IPM – Applied Research and Outreach Programs.* USDA NIFA CPPM EIP.


Ghimire, S. and C. Miles. Soil-biodegradable plastic mulch professional development training. UConn Extension and Washington State University

Ghimire, S. Sulfate of potash crop trial. Rose Mill Co. West Hartford, CT.

Ghimire, S., J. Bonelli, M. Kelly. Mashantucket Pequot Federally Recognized Tribes Extension Program. USDA/NIFA FRTEP.

Ghimire, S., J. Bonelli, M. Kelly. MPTN Sustainable Cropping Systems Outdoor Classroom. Indian Land Tenure Foundation.


Henderson, J., Morris, T., Guillard, K., Inguagiato, J., Rackliffe, S., and Wallace, V. *Organic Turf and No-pesticide Turf Demonstration Project for Lawns and Athletic Fields.* EPA/CT DEEP. (Updates to UConn FertAdvisor App.)


Legrand, A. In cooperation with the CNLA Education Committee. *Spanish Program for Green Industry Employees.* CNLA 2020 Winter Symposium & Expo.
Legrand, A. Vegetable IPM – Applied Research and Outreach Programs. USDA NIFA CPPM EIP.


Legrand, A. and C. Witharana. Integrated Systems Research and Development in Automation and Sensors for Sustainability of Specialty Crops. SAES Capacity Grant Program.

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. Turfgrass IPM – Applied Research and Outreach Programs. USDA NIFA CPPM EIP.

Wallace, V. 2020 CNLA Winter Symposium Chair, Plantsville, CT. Moderator, Presenter.

Wallace, V. 2020 UConn Turfgrass Field Day. Virtual, CT. Moderator, Presenter.


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

Wallace, V. 2018 National Turfgrass Evaluation Trial-Tall Fescue Test, Year 2, National Turfgrass Evaluation Program.


Cross-striped cabbageworm on broccoli

Photo: Ana Legrand

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.

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Audubon Society of Connecticut
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Bartlett Arboretum, Stamford, CT
Charles Beasley, Cheshire, CT
Chip Beckett, Beckett Farm, Glastonbury, CT
Steve Bengtson, Cold Spring Brook Farm, Berlin, CT
Jonathan Bishop and Michaele Williams, Bishop’s Orchards, Guilford, CT
Evan Brand, Prides Corner Farms, Lebanon, CT
Richard Calarco, Director, Town of Hebron Parks and Recreation Department, Hebron, CT
Alex Carpenter, Assawaga Farm, Putnam CT
Spencer Cartabiano, Willow Valley Farm, Willington, CT
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Connecticut Conference of Municipalities
Connecticut Department of Agriculture
Connecticut Department of Energy and Environmental Protection (DEEP)
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 Outdoor & Environmental Education Association
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 Tree Protective Association
Silvio O. Conte National Fish & Wildlife Refuge
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New England Vegetable & Berry Growers’ Association
New England Vegetable & Fruit Conference Steering Committee
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High density apple production on a Connecticut farm.
Photo: Mary Concklin

Basil cultivars for Asiatic garden beetle experiments.
Photo: Kaelin Smith