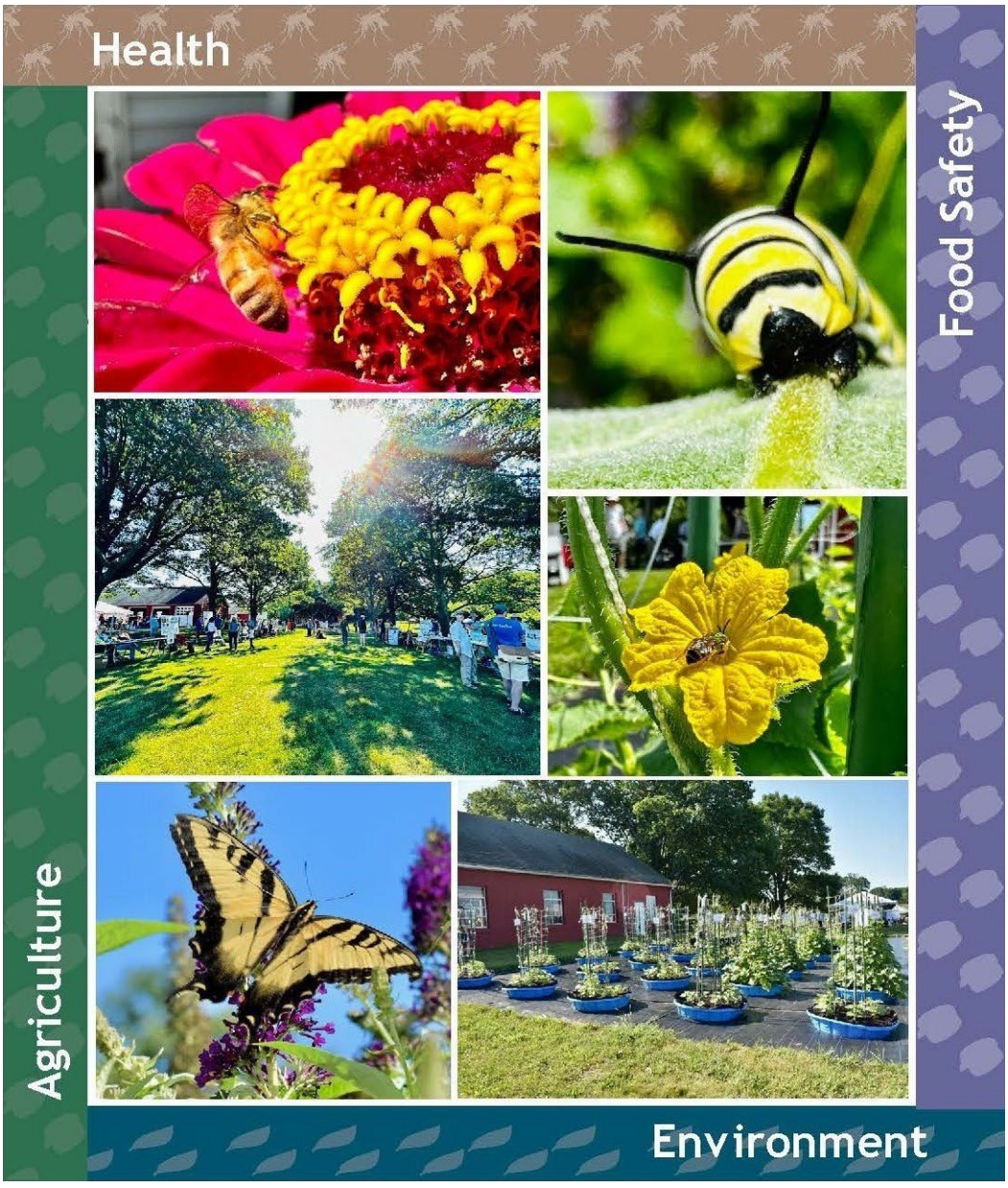
The Connecticut Agricultural Experiment Station
114th Plant Science Day

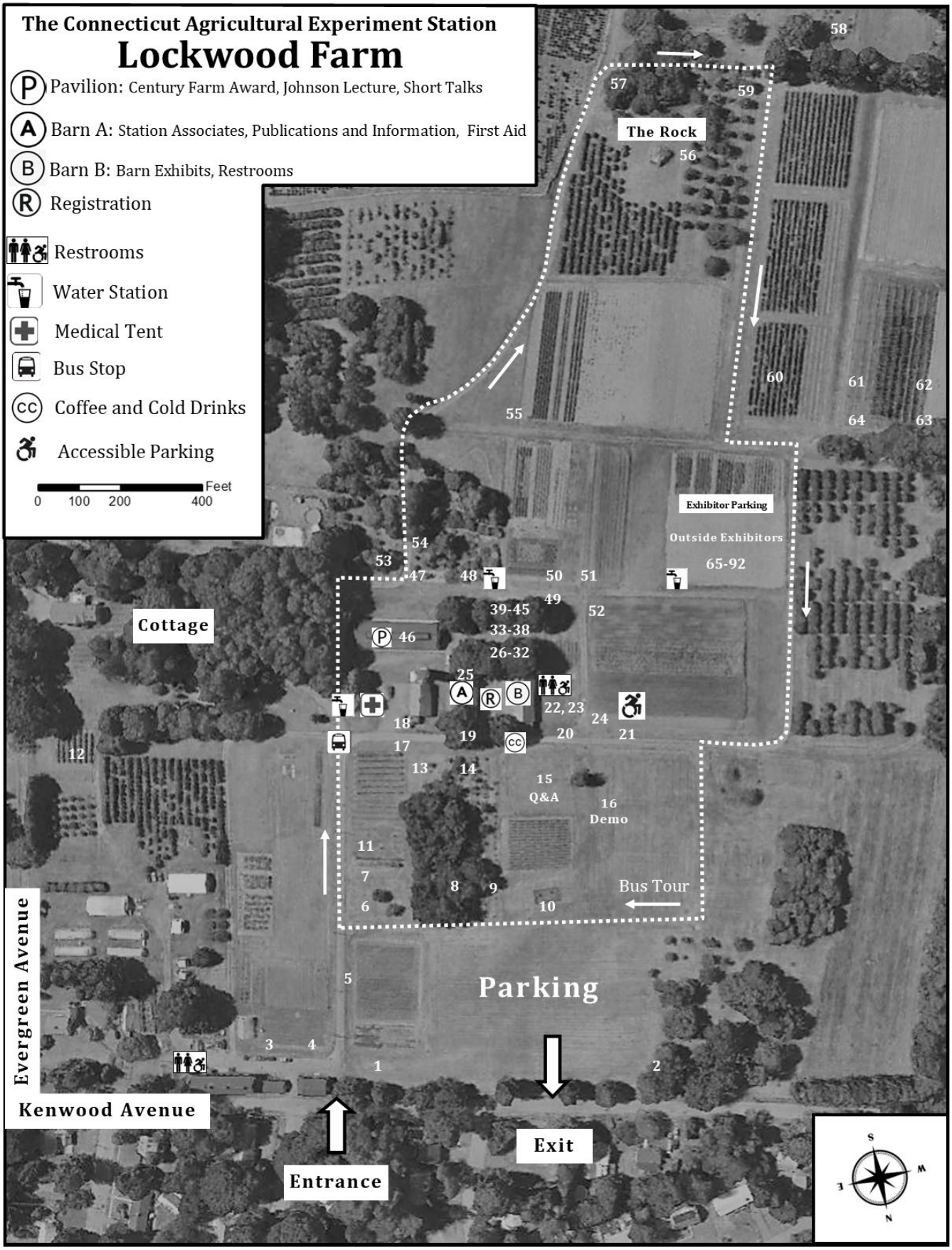
Lockwood Farm
890 Evergreen Avenue, Hamden, CT 06518
Wednesday, August 7, 2024



CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875


The Connecticut Agricultural Experiment Station
Lockwood Farm
P Pavilion: Century Farm Award, Johnson Lecture, Short Talks
A Barn A: Station Associates, Publications and Information, First Aid
B Barn B: Barn Exhibits, Restrooms
R Registration
Restrooms
Water Station
Medical Tent
Bus Stop
CC Coffee and Cold Drinks
Accessible Parking
Feet
0 100 200 400
The Rock
Exhibitor Parking
Outside Exhibitors
65-92
Cottage
Evergreen Avenue
Kenwood Avenue
Parking
Bus Tour
Entrance
Exit
Q&A
Demo
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The Connecticut Agricultural Experiment Station's **Plant Science Day** is held at Lockwood Farm on the first Wednesday of August every year, beginning in 1910. This one-day event features reports on research, field plots, barn exhibits, tours, and other opportunities for Connecticut residents and attendees to discuss many topics of plant science on an informal basis and interact with CAES scientists and staff. While the event only lasts one day, planning for Plant Science Day is a year-round activity spearheaded by the *Plant Science Day Planning Committee*. This committee, chaired by Vickie M. Bomba-Lewandoski, is comprised of CAES staff members who strive to make this event as meaningful and organized as possible. We acknowledge their hard work and thank them for allowing this historic event to happen each year.

Plant Science Day Planning Committee

Michael Ammirata
Terri Arsenault
Joseph Barsky
Douglas Brackney
Gregory Bugbee
Meghan Cahill
John Donovan
Vickie Bomba-Lewandoski
Richard Cecarelli
Kelly Fairbrother
Jeffrey Fengler
Andrea Gloria-Soria
Regan Huntley
Lisa Kaczenski
Noelle Khalil
Michael Last
Joseph Liquori
Justin Lizon
Robert Marra
Goudarz Molaei
Craig Musante
John Ranciato
Natalie Rivera
Kitty Prapayotin-Riveros
Neil Schultes
Summer Stebbins
Blaire Steven
Lindsay Triplett
Jason White
Quan Zeng
Nubia Zuverza-Mena

Program booklet created, compiled, and edited by
Vickie Bomba-Lewandoski, Kelly Fairbrother, and Summer Stebbins

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HISTORY OF LOCKWOOD FARM, HAMDEN

Lockwood Farm is a research facility of The Connecticut Agricultural Experiment Station. The farm was purchased in 1910 with monies provided by the Lockwood Trust Fund, a private endowment. The original farm was 19.6 acres with a barn and a house. Since then, several adjacent tracts of land have been purchased, enlarging the property to 75.0 acres.

The farm is located in the extreme southern portion of the Central Lowland Physiographic Province. This lowland region is underlain by red stratified sandstone and shale of Triassic age from which resistant lava flows project as sharp ridges. One prominent ridge, observed from the farm, is Mount Carmel (the “Sleeping Giant”), which lies to the north. The mountain is composed of diabase, a dense igneous rock which has a fine crystalline texture, having been pushed up as magma close to the surface where it cooled quickly. The "trap rock" of this region is either diabase, or its compositional equivalent basalt which was extruded onto the surface in lava flows that form topographic "trappa" or "trappe" (steps or stairs) and it is commonly used as a building material and ballast for railroad tracks.

The topography of the farm is gently rolling to hilly and was sculpted by the Wisconsin glacier that overrode the area some 10,000 years ago and came to rest in the vicinity of Long Island. A prominent feature of the farm is a large diabase boulder that was moved by flowing ice from its place of origin, and is therefore also known as a Glacial Erratic. The boulder probably fell onto the top of the glacier oozing its way down past the Sleeping Giant's head during the waning stage of the last continental glaciation. It was deposited here, near the toe of the waning glacier, onto "till," an unsorted mass of sandy or silty material mixed with rounded pebbles and boulders that had been pushed in front of, or under, the glacier, and deposited as the ice melted. Most of the boulders around the area, such as those in the nearby stone walls, are rounded and their surfaces have been ground smooth by abrasion beneath the glacier. The boulder came to rest on the crest of a hillock to the south of the upper barns. From this hillock, Sleeping Giant State Park comes into full view and is a favorite spot for photographers and other artists.

The soils of the farm developed on glacial drift are composed primarily of the underlying reddish-brown sedimentary rocks. The soils, characterized by reddish-brown profiles, are the well-drained Cheshire fine sandy loam (67%), the moderately well-drained Watchaug loam (10%) and the shallow-to-bedrock Sunderland fine sandy loam (16%). Along the western edge of the farm, adjacent to the Farmington Canal Greenway, lies a level terrace of stratified glacial drift. There, the well-drained Branford loam and the moderately well-drained Ellington loam (7%) dominate. Elevations on the farm range from 140 to 220 feet above mean sea level.

The farm lies in the Coastal Plain Climatological District. The local climate is influenced by its proximity to Long Island Sound, which lies 9 miles to the south. The average frost-free season is 190 days, compared to 180 days at the inland Valley Laboratory in Windsor.

In 1936, a fully instrumented weather station was established on the farm. The weather data are reported to and published by the U.S. Weather Service in their cooperative observer program. The mean annual temperature for the farm is 49.0 F. A record high temperature, 104.0 F, was observed on July 4, 1949. A record low temperature, -24.0 F was recorded on February 16, 1943. The mean annual precipitation for the farm is 52.6 inches. The greatest total precipitation, 74.36 inches, was recorded in 2011. The least precipitation, 30.4 inches, was recorded in 1965. The mean annual snowfall for the farm is 32.3 inches. The greatest total snowfall, 78.5 inches, was recorded during the winter of 1995-1996. The least total snowfall, 10.0 inches, was recorded in 2011-2012.

The farm provides a field laboratory for Experiment Station scientists who learn how to control the pathogens and insects that attack trees, fruit, and vegetables. In some experiments, scientists learn how crops grow and develop strategies for efficient crop production. All field research can be observed at Plant Science Day, held each year on the first Wednesday in August.

2024 CONNECTICUT CENTURY FARM AWARD

The Century Farm Award is selected by the Connecticut Agricultural Information Council and goes to a deserving farm that has been in operation for more than 100 years. The award is presented at the CAES Plant Science Day in August and recognized at Ag Day at the Capitol.

The 2024 winner of the Century Farm Award is:

Geremia Farms
Wallingford, CT

Proclamation from Governor Ned Lamont:

In 1908, Gustave and Lucy Geremia immigrated to Connecticut from Italy in search of a new life in America. They purchased the initial 27 acres of land which is currently the site of Geremia farms at 415 Barnes Road in Wallingford as a vegetable farm. Gustave and Lucy imparted their knowledge of agriculture to their son, Salvatore, who was born on the farm in 1925. He grew up in humble beginnings on the farm, learning skills and a work ethic that allowed the family to weather the Great Depression and to fortify him for his future in farming. He and his with wife Elizabeth purchased additional land and expanded the farm to include native varieties of field produce, berries, orchard crops, and some greenhouse plants propagated in a high tunnel system. The family started a farm stand in 1955 which grew and prospered – as did the Geremia family. Joseph Geremia was born into the working farm family and took over the operation in 1989. His generation took this small family farm and transformed it into a sprawling enterprise of controlled environment agriculture that has continually evolved to utilize the most cutting-edge greenhouse technologies to improve efficiency, production, plant vigor and natural resources conservation. Greenhouses cover seven acres of land, and many more acres are utilized for field crop production. Joseph Geremia has expanded the roadside stand to be a purveyor of greenhouse-grown plants, fresh produce sourced from his fields in Wallingford and his other locations, as well as baked goods from his own commercial kitchen. Geremia Greenhouses produces countless annual, perennial, and succulent plants and quality orchids each year for distribution to local garden center and nursery customers throughout the Northeast. Joseph and his wife Dawn, and their children Madeline, Lucas, Liam, and Elizabeth, will continue the tradition of agriculture, appreciation for the Earth, and community engagement that will propel Geremia Farms for the next 100 years.

THE SAMUEL W. JOHNSON MEMORIAL LECTURE (Pavilion)

The Experiment Station Board of Control established the lectureship to further discuss issues of concern to Connecticut residents and the Station. Professor Johnson was director of the Experiment Station from 1877 to 1900 and a leader in the establishment of American agricultural experiment stations.

ANSWERS TO YOUR QUESTIONS (Plot 15)

Staff members in the "questions and answers" tent are prepared to give information on identification of insects, plant disorders, soils and their management, and other problems of growers and gardeners.

KIDS' CORNER (Plot 21)

Come to the Kids' Corner to pick up your child's passport and a gift. The passport is a special activity for young children to help them enjoy and explore Plant Science Day. There are six different stations located throughout Lockwood Farm that they can visit, where they can ask questions, learn about the topic featured at the station, and then receive a special stamp for their passport. Once the passport is complete, they can go to the Self-Guided Activity Plot (plot 22) to collect a CAES patch.

SELF-GUIDED ACTIVITY FOR ALL CHILDREN, INCLUDING GIRL SCOUTS (Plot 21)

Girl Scouts and older children should be directed to this plot. A self-guided worksheet is available for all children, and it is better suited for older children than the passport. The activity will guide them to interact with some of the many people here today helping to put science to work for society. In addition, Girl Scouts may use the activity to complete steps towards their Naturalist Legacy badge. Once the activity is completed, all children can return to this plot to collect either a Girl Scout or CAES patch. Children with completed passports should return here to collect their badges as well.

CONNECTICUT PESTICIDE CREDITS (Registration, R)

Connecticut pesticide credits will be offered for attending Plant Science Day. If you are interested in obtaining pesticide credits, you must sign in at the registration desk (R) at the start of the day between 9:30 a.m.-10:00 a.m., to obtain your Pesticide Credit Passport, which you must have validated after you have attended or visited each of the required talks, demonstrations, and barn exhibits. Sign out begins at 3:35 p.m. at the Registration Desk (R), where you will redeem your Passport for your Pesticide Credit Form.

Connecticut Pesticide Credits Offered: **ALL CATEGORIES and PRIVATE APPLICATOR (PA) CATEGORY / 3.50 TOTAL CREDIT HOURS.**

SOCIAL MEDIA LINKS

Keep current with The Connecticut Agricultural Experiment Station by using our **Social media** and **email alert** resources.

The CAES is encouraging our constituents to share their photos about **The CAES** and **Plant Science Day** on social media using the hashtag **#CT_CAES**. Selected photos may be used in future publications.

Facebook www.facebook.com/CT.CAES

www.x.com/CT_CAES

YouTube www.youtube.com/user/CTAGEXPSTATION

Instagram www.instagram.com/ct.caes/

Wikipedia http://en.wikipedia.org/wiki/Connecticut_Agricultural_Experiment_Station

Pinterest www.pinterest.com/caes123

Spotify https://open.spotify.com/show/3ZDVEkmebY1rubzb9Gc936

To visit our webpage, go to https://portal.ct.gov/caes,
or scan our QR code below with your smartphone.

E-mail mailing list

Mail Chimp sign up for our CAES e-mail list
https://mailchi.mp/d0807919f3d2/caes-email-notifications

NO PETS, PLEASE. SERVICE DOGS ONLY.

Under the Americans with Disabilities Act (ADA), "a service animal is defined as a dog that has been individually trained to do work or perform tasks for an individual with a disability."

Also, under the ADA, "emotional support animals, comfort animals, and therapy dogs are not service animals under Title II and Title III of the ADA."

JUST A REMINDER THAT LOCKWOOD FARM IS A WORKING FARM WITH ACTIVE RESEARCH BEING CONDUCTED, SO PLEASE RESPECT THE SCIENTISTS' WORK.

After the lecture, visitors may remain in the pavilion to eat lunch. Coffee and cold drinks are free.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

114th PLANT SCIENCE DAY

Gates open at 9:30 a.m.
Program begins at 10:00 a.m.
Event 10:00 a.m. – 4:00 p.m.

AGENDA

Moderator – Vickie M. Bomba-Lewandoski, Information Officer

10:00 a.m. – 10:15 a.m. **PAVILION**
MORNING GREETING AND OPENING REMARKS
Jason C. White, Ph.D., Director
The Connecticut Agricultural Experiment Station

10:15 a.m. - 10:45 a.m. **PAVILION**
Hany Dweck, Ph.D., Assistant Agricultural Scientist II, Department of Entomology
Harnessing Chemical Ecology for Protecting Fruit Crops from Spotted Wing Drosophila
A major agricultural threat has recently emerged in North America and Europe. Spotted wing Drosophila (SWD) has begun to ravage fruit crops across these continents. Whereas other species of Drosophila lay eggs in fermenting fruit of no value, *D. suzukii* lays eggs in ripe fruit, ruining crops. Our laboratory investigates the mechanisms underlying SWD's distinct preferences compared to other Drosophila species. This knowledge serves as the basis for developing innovative strategies to manage this serious fruit pest.

10:15 a.m. – 10:35 a.m. **TECHNICAL DEMONSTRATION TENT**
(20-minute demonstration, repeated twice during the day, 10:15 a.m. & 2:30 p.m.)
Jeremiah R. Foley IV, Ph.D., Assistant Agricultural Scientist II, Department Environmental Science and Forestry
How to Prevent the Spread of Aquatic Invasive Species (AIS)
Interested in keeping your cherished waterbodies free of aquatic invasive species (AIS)? Join the Office of Aquatic Invasive Species (OAIS) in their demonstration on how to prevent the spread of aquatic plants. Did you know that Connecticut is considered the gateway to the rest of New England for AIS? Of the over 250 waterbodies surveyed since 2004 by OAIS, we found that over half have at least one AIS. This proportion is much higher than surrounding New England states. For example, only 1% of Maine's waterbodies have at least one aquatic invasive plant. This technical demonstration will show you how AIS spread, where they are most likely to occur when trailering your vessel, and how to remove and dispose of them effectively and efficiently.

10:40 a.m. – 11:00 a.m. **TECHNICAL DEMONSTRATION TENT**
(20-minute demonstration, repeated twice during the day, 10:40 a.m. & 3:15 p.m.)
Joseph Liquori, Agricultural Research Technician I, Department of Plant Pathology and Ecology
Get Crafting with Grafting: Tomato/Potato Plant
Grafting refers to the practice of joining two related plants to form a new union. This technique is widely used in fruit production, vegetable production, and landscape tree/shrub production. Benefits include controlling growth habit (dwarf trees), disease resistant root stocks, propagation of hard to clone plants, and more. This demonstration will show you how to graft a tomato (*Solanum lycopersicum*) and potato (*Solanum tuberosum*) to produce a plant which produces both tomato fruit and potato tubers; commonly referred to as the "ketchup and fries plant".

10:45 a.m. - 11:05 a.m. **PAVILION**
CENTURY FARM AWARD
Geremia Farms, Wallingford, CT

11:05 a.m. – 11:15 a.m. **PAVILION**
EXPERIMENT STATION ASSOCIATES
Cheryl Cappiali, President, Experiment Station Associates

11:15 a.m. – 12:00 noon **PAVILION**
THE SAMUEL W. JOHNSON MEMORIAL LECTURE
Susan K. Brown, Ph.D.
Herman M. Cohn Professor of Agriculture and Life Sciences
School of Integrative Plant Science, Horticulture and Plant Breeding Sections
Cornell AgriTech
Adventures in Apple Breeding

12:00 p.m.-1:15 p.m. **LUNCH**

1:15 p.m.-1:45 p.m. **PAVILION**
Raquel Rocha, Ph.D., Assistant Agricultural Scientist II, Department of Plant Pathology and Ecology
Managing Root-Knot Nematodes in Connecticut: Current Research Initiatives at CAES
Root-knot nematodes are known to infect all economically important crops, including corn, soybean, cotton, wheat, vegetables, and fruit. In Connecticut, root-knot-infested soils have been found across the state in vegetable, tree, small fruit, and ornamental fields. Although root-knot nematodes are prevalent in the state, the damage they cause is often underestimated because their symptoms are non-specific and can be wrongly diagnosed as signs of nutritional deficiencies or stress caused by environmental factors. Managing root-knot is challenging and often requires combining synthetic chemicals, plant resistance, and cultural practices. The Rocha Lab at CAES is dedicated to researching root-knot nematodes to find more sustainable and cost-effective ways to control nematode diseases. In this talk, audiences will learn about our current projects, including identifying new bacterial sources for biocontrol development, investigating RKN adaptations to different temperature regimens, and identifying molecular components involved in nematode development and feeding. We'll also discuss how this information can be used to prevent nematode parasitism.

1:45 p.m.-2:15 p.m. **PAVILION**
Andrea Gloria-Soria, Ph.D., Assistant Agricultural Scientist II, Department of Entomology
New Challenges in Vector Control and How Population Genetics Can Help
The northern house mosquito *Culex pipiens* is a vector of West Nile virus (WNV) in the USA, where human cases are reported annually. There are no available vaccines for WNV, and disease prevention is achieved through personal protection and vector control activities when the virus is circulating in local mosquito populations. Continuous use of insecticides to reduce or suppress mosquito populations can result in rapid development of insecticide resistance (IR), compromising the use of common insecticides in subsequent interventions to control disease outbreaks. Monitoring the presence and frequency of IR in *Cx. pipiens* populations is essential to ensure sustainable use of currently available and approved insecticides. We are using next-generation sequencing methods to investigate the distribution of genetic variants linked to pyrethroid (a common class of insecticides) resistance across the USA. The results of this investigation will ultimately inform and guide operational mosquito control activities in the region and establish the basis of molecular screens to monitor IR in *Cx. pipiens* in the country.

2:15 p.m. **PAVILION**
Adjourn Main Talks

2:30 p.m. – 2:50 p.m. **TECHNICAL DEMONSTRATION TENT**
(*20-minute demonstration, repeated twice during the day, 10:15 a.m. & 2:30 p.m.*)
Jeremiah R. Foley IV, Ph.D., Assistant Agricultural Scientist II, Department Environmental Science and Forestry
How to Prevent the Spread of Aquatic Invasive Species (AIS)
Interested in keeping your cherished waterbodies free of aquatic invasive species (AIS)? Join the Office of Aquatic Invasive Species (OAIS) in their demonstration on how to prevent the spread of aquatic plants. Did you know that Connecticut is considered the gateway to the rest of New England for AIS? Of the over 250 waterbodies surveyed since 2004 by OAIS, we found that over half have at least one AIS. This proportion is much higher than surrounding New England states. For example, only 1% of Maine's waterbodies have

at least one aquatic invasive plant. This technical demonstration will show you how AIS spread, where they are most likely to occur when trailering your vessel, and how to remove and dispose of them effectively and efficiently.

3:15 p.m.-3:35 p.m. **TECHNICAL DEMONSTRATION TENT**
(*20-minute demonstration, repeated twice during the day, 10:40 a.m. & 3:15 p.m.*)
Joseph Liquori, Agricultural Research Technician I, Department of Plant Pathology and Ecology
Get Crafting with Grafting: Tomato/Potato Plant
Grafting refers to the practice of joining two related plants to form a new union. This technique is widely used in fruit production, vegetable production, and landscape tree/shrub production. Benefits include controlling growth habit (dwarf trees), disease resistant root stocks, propagation of hard to clone plants, and more. This demonstration will show you how to graft a tomato (*Solanum lycopersicum*) and potato (*Solanum tuberosum*) to produce a plant which produces both tomato fruit and potato tubers; commonly referred to as the "ketchup and fries plant".

3:35 p.m. **TECHNICAL DEMONSTRATION TENT**
Adjourn Technical Demonstrations

3:35 p.m. SIGN-OUT **(For those requesting pesticide credits) (R)**
Attendees can pick up their Pesticide Credit forms at the registration table (R).

BUS STOP ( )

10:00 a.m.-11:00 a.m. & 1:00 p.m.-3:30 p.m. (tours run every half hour during these hours)

Take a number and have a seat under the willow and wait for the next bus tour

10:00 a.m. - 11:00 a.m. **MEET AT THE BUS STOP ( )**
A 30-minute bus tour of Lockwood Farm narrated by a CAES Staff member. Tours run every half hour.

1:00 p.m. - 3:30 p.m. **MEET AT THE BUS STOP ( )**
A 30-minute bus tour of Lockwood Farm narrated by a CAES Staff member. Tours run every half hour.

LOCKWOOD FARM WALKING TOUR
(Meet at the Registration Desk, R)

11:00 a.m.–12:00 p.m.

11:00 a.m. - 12:00 p.m. **MEET AT REGISTRATION DESK (R):**
Robert E. Marra, Ph.D., Associate Agricultural Scientist, Department of Plant Pathology and Ecology
A one-hour guided tour of selected “off the beaten path” field plots.

ALL ABOUT APPLES AND DISEASES WALKING TOUR
(Meet at the Registration Desk, R)

1:00 p.m.-1:30 p.m.

1:00 p.m. - 1:30 p.m. **MEET AT THE Registration Desk (Plot R)**
Quan Zeng, Ph.D., Agricultural Scientist, Department of Plant Pathology and Ecology
A 30-minute guided walking tour all about apples and their diseases. Apples are the second most consumed fruits in the United States. Do you know how apples are propagated, grown, and protected from pests and diseases? In this walking tour, you will learn all you need to know about apples, their diseases and pests, and ongoing research conducted at CAES for sustainable disease management of apple.

BARN EXHIBITS (BARN B)

Nanotechnology in Agriculture
Department: Analytical Chemistry
Investigators: Nubia Zuverza-Mena, Ph.D., Yi Wang, Ph.D., Christian Dimkpa, Ph.D., and Jason C White, Ph.D., *assisted by* Milica Pavlicevic, Ph.D., Trung Huu Bui, Ph.D., Raja Muthuramalingam, Ph.D., Jingyi Zhou, Ph.D., Chaoyi Deng, Ph.D., Paul Aikpokpodion, Ph.D., Hina Ashraf, Ph.D., Mr. John Ranciato, and Mr. Craig Musante.
Abstract: The role of nanotechnology in agriculture is becoming critical in our quest to achieve sustainable food production. With unfavorable crop production conditions (such as polluted grounds, nutrient-depleted soils, drought, heat, salinity, excessive radiation, as well the presence of disease-causing organisms), it is essential to develop efficient products to protect crops in a sustainable manner. Current agricultural practices are inefficient. For example, plants utilize less than 10% of the pesticides and fertilizers supplied to them. Therefore, growers need to overapply to effectively supply nutrients and control diseases; this causes unwanted effects in the environment, such as pollution of soil and water. Materials at the nanoscale (~1-100 nm) have unique properties and a strong potential to revolutionize the way we grow food. Because of their minute dimensions and high reactivity, engineered nanomaterials (ENMs) can be an efficient source of nutrients for improving plant health, serve as tools to facilitate the plant uptake of contaminants from soil (to enhance phytoremediation), and also help protect crops from the abiotic and biotic stressors mentioned above. Our greenhouse and field research has shown that low doses of ENMs (~100 - 500 parts per million) can mitigate stress and increase yield in different crops. Still, more studies are needed to ensure safe and responsible application of nano-agrichemicals.

Mighty Monarchs and Busy Bumblebees
Department: Entomology
Investigators: Kelsey E. Fisher, Ph.D., and Breahna Gillespie, Ph.D. *assisted by* Karena Kulakowski, Dom Rowland, and Emma Donahey
Abstract: Pollinator populations have been declining for the past several decades. One of the causes we can control is the lack of available nesting, foraging, and overwintering habitat. Many CT residents are doing their part by establishing and maintaining small gardens with blooming flowers that provide nectar for pollinators across the state. This is a great first step! But, focusing solely on floral habitat restoration may not be enough, as nesting and overwintering habitat may be limited as well. Come learn about our current research projects that will help us understand habitat needs for all the life stages of some of our favorite, charismatic pollinators: monarch butterflies and bumblebees. Our pollinator friends are looking forward to meeting you!

Changes in Connecticut's Forest Composition Following Pest and Pathogen Invasions
Department: Environmental Science and Forestry
Investigator: Elisabeth B. Ward, Ph.D.
Abstract: Forest composition in Connecticut is changing in response to multiple stressors, including canopy tree decline and mortality from pest and pathogen invasions. Canopy gaps increase understory light availability, which can promote tree regeneration. However, the size of canopy gaps may not be sufficient to recruit regenerating trees into the overstory and increases in understory light availability can also promote the spread of non-native, invasive plants, which could outcompete regenerating trees. Forest management practices that enhance understory light availability and control invasive plants may, therefore, be required to increase the abundance and diversity of regenerating trees following overstory tree decline and mortality. Research in the Department of Environmental Science and Forestry is investigating how understory plant community composition and tree regeneration is changing in response to canopy tree decline and mortality from Emerald Ash Borer and Beech Leaf Disease—two prevalent and damaging invasive forest pests that are now ubiquitous across the state. In particular, this work investigates the effects of different forest management interventions to help improve practices to promote native-dominated understory plant communities and tree regeneration following catastrophic losses of overstory tree species in Connecticut's forests.

Managing Root-Knot Nematodes in Connecticut: Current Research Initiatives
Department: Plant Pathology and Ecology
Investigator: Raquel Rocha, Ph.D. *Assisted by* Monique Rodrigues e Silva, Tobi Okunade, and Andrew Medina
Abstract: Root-knot nematodes (RKN) are known to infect all economically important crops, including corn, soybean, cotton, wheat, vegetables, and fruit. In Connecticut, root-knot-infested soils have been found across the state in vegetable, tree, small fruit, and ornamental fields. Although root-knot nematodes are prevalent in the state, the damage they cause is often underestimated because their symptoms are non-specific and can be wrongly diagnosed as signs of nutritional deficiencies or stress caused by environmental factors. Managing root-knot is challenging and often requires combining synthetic chemicals, plant resistance, and cultural practices. The Rocha Laboratory at The Connecticut Agricultural Experiment Station is dedicated to researching root-knot nematodes to find more sustainable and cost-effective ways to control nematode diseases. In this exhibit, audiences will learn about our current projects, including identifying new bacterial sources for biocontrol development, investigating RKN adaptations to different temperature regimens, and identifying molecular components involved in nematode development and feeding. We'll also discuss how this information can be used to prevent nematode parasitism.

Post-Doctoral Life and Research

Department: The Connecticut Agricultural Experiment Station (CAES) Post-Doctoral Association (PDA)

Investigators: Rebecca M. Johnson, Ph.D., David J. Giesbrecht, Ph.D., Ravikumar R. Patel, Ph.D., Stephen J. Taerum, Ph.D., and many others.

Abstract: Following graduate school, many Ph.D.'s spend time as post-doctoral scientists (postdocs) while receiving additional training, publishing more research, and applying for permanent positions. The first postdoc joined The Connecticut Agricultural Experiment Station in 1992. Since then, around 75-80 postdocs have worked at CAES while authoring and contributing to many papers, advancing their fields of interest, and working for the citizens of Connecticut. In 2021 the post-doctoral scientists at the station came together to form the first CAES Post-doctoral Association (PDA), modelled off existing organizations at many universities. Since then, the CAES PDA has worked to welcome new postdocs, provide opportunities for professional development, and create a sense of community and connectedness in what is typically a highly transient group. Last fall the CAES PDA hosted their 1st Annual Postdoc Symposium featuring 6 short talks, 12 poster presentations, and Dr. John Carlson from Yale University as a keynote speaker. The CAES PDA currently consists of around 20 postdocs from at least seven different countries working across the four departments at CAES. They study topics ranging from bacterial and protist interactions with plants, the use of nanoparticles for the delivery of nutrients and genetic material, and mosquito-virus interactions.

Collaborations to Manage Hemlock Woolly Adelgid with Biological Control in Connecticut Riparian Forests: The Farmington River, a Case Study

Department: Valley Laboratory

Investigator: Carole A. S. J. Cheah, Ph.D.

Abstract: Hemlock woolly adelgid (HWA), a devastating non-native pest of Eastern and Carolina hemlocks, continues to pose a serious threat, especially with climate warming and unpredictable winters. Eastern hemlock is the most abundant conifer species in Connecticut and is vitally important for temperature regulation, water quality and critical fish and wildlife habitat. Connecticut has been managing and effectively controlling HWA invasions with an introduced ladybeetle adelgid predator from Japan, *Sasajiscymnus tsugae*, since 1995. This species was identified by Station and Japanese scientists in 1997, subsequently researched and released, and is the first HWA biological control agent released in North America. Recent collaborations between the CAES, state, municipal and private foresters, water companies, towns, land trusts, bird sanctuaries and more, have greatly expanded biological control to counter HWA resurgence and spread to protect our hemlocks. Priority conservation areas such as miles of riparian watershed forests are now being protected without chemicals and Connecticut's first Wild and Scenic River, the Upper and Lower Farmington River, with Salmon Brook, is a case study for this important strategy.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

The experiments exhibited here depict only a portion of the work performed by Experiment Station scientists. In addition to Lockwood Farm, Griswold Research Center, and laboratories in New Haven and Windsor, Station scientists use state forests, private orchards, lakes, and farms for their experiments. Experiments and surveys are conducted in many widely separated towns of the state.

THE EXPERIMENT STATION WEB PAGE: http://portal.ct.gov/caes

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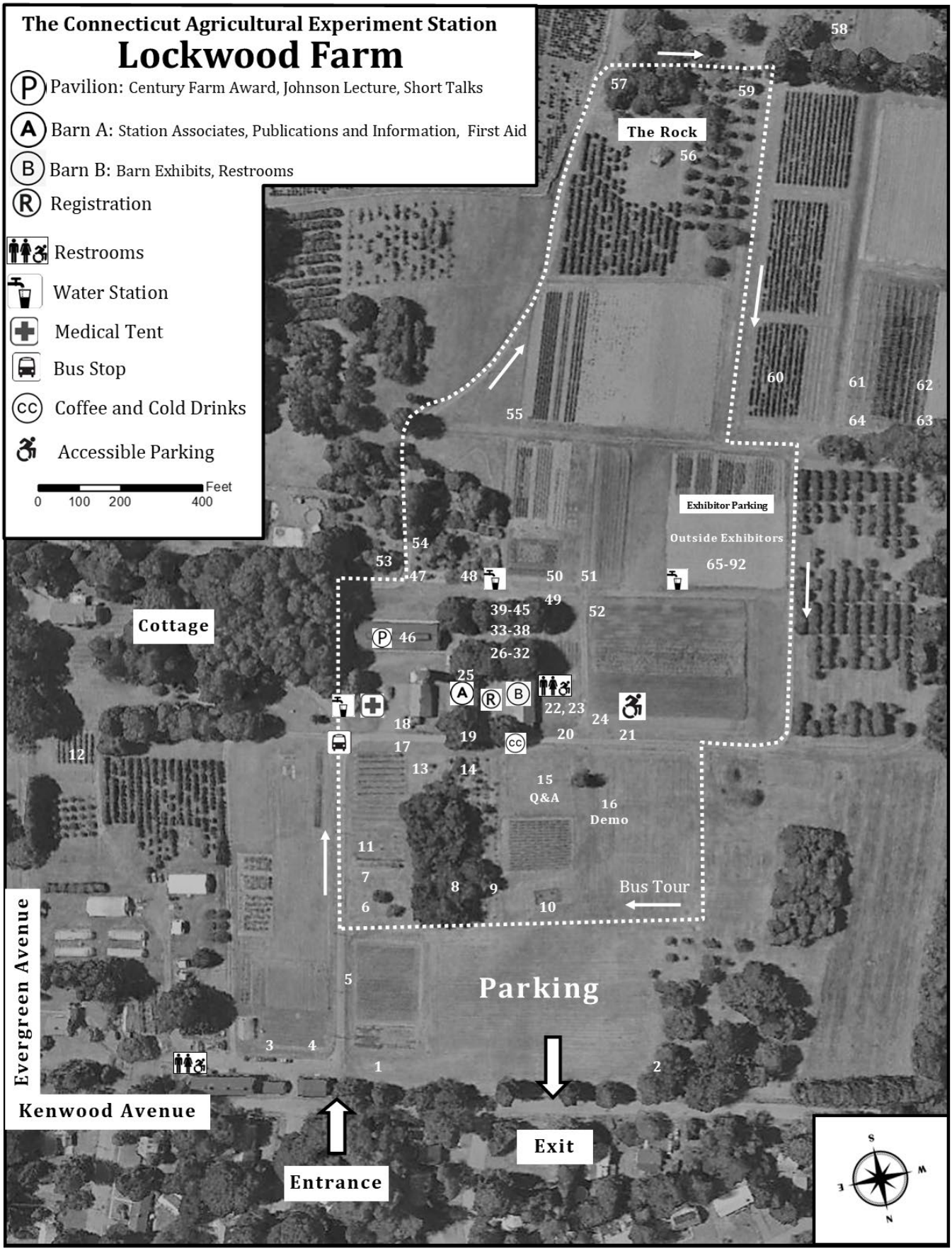
CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875


The Connecticut Agricultural Experiment Station
Lockwood Farm
P Pavilion: Century Farm Award, Johnson Lecture, Short Talks
A Barn A: Station Associates, Publications and Information, First Aid
B Barn B: Barn Exhibits, Restrooms
R Registration
Restrooms
Water Station
Medical Tent
Bus Stop
CC Coffee and Cold Drinks
Accessible Parking
Feet
0 100 200 400
The Rock
Exhibitor Parking
Outside Exhibitors
65-92
Cottage
Q&A
Demo
Bus Tour
Parking
Evergreen Avenue
Kenwood Avenue
Entrance
Exit
S
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E
N

FIELD PLOT LISTING

Outside Exhibitors (Plots 17-20, 65-92) are invited to participate.

The plots at Lockwood Farm are planted and maintained by The Connecticut Agricultural Experiment Station's scientists and technical staff along with the help of Farm Manager Richard Cecarelli, Agricultural Research Technician II, Rollin Hannan, and Farmer, Joseph Toth as well as Seasonal Resource Assistants Sebastian Bernal, Miles Houston, and Kathleen Williams. Other plots here at the farm provide food for the Connecticut Food Bank.

1. Chinese Chestnut Trees
2. Nut Orchard
3. The Fight Against Potato Viruses
4. Strawberry Disease Resistance Trial
5. Monitoring for Sweet Corn Insect Pest Resistance
6. Commercial Chestnut Cultivars
7. Commercial Chestnut Seedlings
8. Control of Blight on American Chestnuts
9. New Hybrid Chestnut Orchard
10. Remote Access Weather Station
11. Grapevine Demonstration Plot: Table Grapes
12. Grapevine Demonstration Plot: Chardonnay Wine Grapes
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18. Crown Castle Cellular Tower
19. Blackie's Hot Dog Stand
20. The Big Dipper
21. Kids' Corner
22. Baby Pools: Low-Cost Containers for Vegetable Production in Urban Agriculture
23. The Effects of Management Practices on Cut-and-come-again Greens Production.
24. Farm Equipment Used at Lockwood Farm
25. Experiment Station Associates
26. Copper-based Materials: Effective to Improve Drought Resistance in Soybean at the Reproductive Stage
27. How Is Nanotechnology Applied in Agriculture?
28. Post-doctoral Life and Research at CAES
29. The Fungus Among Us: Protecting Connecticut Strawberries from Invasive Fungal Pathogens
30. Nonchemical Control of Mugwort (*Artemisia vulgaris*)
31. Micro-nanoscale Polystyrene Co-exposure Impacts the Uptake and Translocation of Arsenic and Boscalid by Lettuce
32. Could "Nanoformulation" Serve as a Sunscreen for Plants, Shielding Them From the Impacts of Climate Change?
33. Investigation of Drink Adulteration with Ethylene Glycol
34. Unseen Guardians: The Crucial Role of Protists in Soil Health
35. Foliar application of copper modified Phytoglycogen: Improving yield and suppresses fusarium wilt infection in watermelon plants
36. Exposure of Soybean to Wildfire Nanoparticles (WFPMs) Leads to High Levels of PAHs in Soybean.
37. Effective New Deer Repellents: You Can Make Your Own!
38. Microbiome on Plants and Its Role in Plant Disease Management
39. The Impact of Micro/nanoplastics in the Agro-food System
40. Mitigation of Nitrogen Loss in a Plant-soil System Through Facile Incorporation of Nanocellulose and Zinc
41. Color Atlas of Fungal Spores: A Laboratory Identification Guide
42. A World of Viruses
43. Enhancing Soybean Disease Resistance and Yield with Silica-Coated Copper Sulfide Nanofertilizers
44. Mycorrhizal Inoculation in Urban Trees
45. Potential For Biological Control of Spotted Wing Drosophila (*Drosophila suzukii*)

46. The Pavilion at Lockwood Farm
47. The 2023 Connecticut Oak Mast Surveillance Program Results
48. Bird & Butterfly Garden
49. The Public Health and Entomology Tent
    a. Statewide Monitoring Program for Mosquito-borne Viral Diseases in Connecticut
    b. Treating White-Tailed Deer For Tick Management in Connecticut
    c. Monitoring Ticks and Tick-borne Pathogens to Better Guide Public Health Action in Connecticut
50. Assessing Pollinator Response to Ecotype Native Plants
51. Office of Aquatic Invasive Species
52. Challenges for Hemp Growers
53. Chestnut Species and Hybrids
54. Healthy Plants—Healthy Business: Support of The Green Industry by Inspection
55. Improving Soil Water Retention Characteristics with Compost
56. The Rock
57. Asian Chestnut Gall Wasp on Chestnut
58. Hybrid Elm Trees
59. Rocky Hill American Chestnut Trees
60. Grapevine Demonstration Plot: Hybrid and Vinifera Grape Cultivars
61. Testing of Biopesticides on Fire Blight Management
62. Mowing for Monarchs
63. New England Ecotypes of American Elms (*Ulmus americana*) and Sugar Maples (*Acer saccharum*)
64. The Fight Against Potato Viruses
65. Cheshire and Hamden Pollinator Pathways
66. Connecticut Christmas Tree Growers Association
67. Connecticut College Arboretum
68. Connecticut Department of Agriculture
69. Connecticut Farm Bureau Association
70. Connecticut Federation of Lakes
71. Connecticut Forest and Park Association (CFPA)
72. Connecticut Invasive Plant Working Group
73. Connecticut Land Conservation Council
74. Connecticut Professional Timber Producers Association
75. Connecticut Tree Protective Association, Inc.
76. CONN-OSHA
77. CT DEEP Pesticide Management Program
78. CT Farmland Trust
79. DEEP Forestry Division, Private and Municipal Lands Program
80. Federated Garden Clubs of Connecticut
81. Levo International
82. Master Gardeners of UConn Extension
83. Sleeping Giant Park Association
84. The American Chestnut Foundation - CT Chapter
85. U.S. Department of Agriculture - Farm Service Agency
86. U.S. Department of Agriculture - Forest Service Northern Research Station
87. U.S. Department of Labor, Wage and Hour Division
88. UConn IPM Program
89. USDA APHIS PPQ
90. USDA Natural Resources Conservation Service
91. Wild Ones Connecticut Mountain Laurel Chapter
92. Northeast Organic Farming Association of CT (CT NOFA)

FIELD PLOT ABSTRACTS

1. Chinese Chestnut Trees

Sandra Anagnostakis, Ph.D. (Emeritus)

These Chinese chestnut trees, planted by Donald Jones in 1941, were selected by chestnut grower W.C. Deming of Litchfield and grafted by the Hartford Park Department. The second tree from the gate is a graft of the cultivar Bartlett that was developed by the Bartlett Tree Co. in Stamford. All have been used by The Experiment Station and the American Chestnut Foundation in crosses with American chestnut trees to produce blight-resistant forest and orchard trees.

2. Nut Orchard

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

This orchard of nut trees was begun by Richard Jaynes in the spring of 1981. There are several named cultivars of chestnut and other nut trees included. Trees that fail to survive or produce well are replaced with new nut cultivars that we want to test for their production potential in Connecticut. All of the recently planted trees are butternuts (*Juglans cinerea*), seedlings from trees that may have some resistance to the butternut canker fungi that have nearly killed the large, grafted butternut trees in this plot.

3. The Fight Against Potato Viruses

Washington da Silva, Ph.D. *Assisted by* Richard Cecarelli

Potato (*Solanum tuberosum* subsp. *tuberosum*) is the fourth main staple crop in the world, behind rice, wheat, and corn. It is grown on all continents and because it is a vegetatively propagated crop, potato is particularly vulnerable to destructive viruses such as potato virus Y (PVY), potato leafroll virus (PLRV), and potato mop-top virus (PMTV). Endemic and emerging viruses are becoming a major threat to smallholding farms because of the negative effects on yield and quality that they induce on the marketable product. In Connecticut, like much of New England, potato is planted primarily for the local market where quality is paramount and any blemishes reduce marketability and farm value, directly impacting growers's income. The da Silva Lab at CAES is working on new sustainable technologies to help in the fight against potato viruses. In his recent work, Dr. da Silva has identified specific ribonucleic acid (RNA) molecules that induce RNA interference (RNAi), an evolved plant defense mechanism that we are seeking to activate or enhance, in plants and prime plants to successfully resist viruses. His team is now developing nanocarriers to deliver those RNA molecules into potato plants to activate RNAi and induce a "vaccination effect" against destructive potato viruses. The several potato varieties planted in the Lockwood farm will be used to test this virus control strategy.

4. Strawberry Disease Resistance Trial

Nathaniel Westrick, Ph.D., *Assisted by* Melissa Trudeau and Savannah Jeffrey

Strawberries are a critical crop in Connecticut, and we grow a wide range of strawberry varieties to fulfill the needs of consumers. These varieties are bred for a number of traits, including flavor, cold hardiness, and aesthetics, but are often not evaluated for resistance to the wide range of diseases capable of infecting this crop. In 2023, a fungal disease known as Anthracnose Crown Rot (ACR) was detected in the state and caused severe wilting and death in many different varieties of strawberries. Given the historical absence of this disease in the state, nothing is known about the resistance of our northern varieties to this pathogen. To address this knowledge gap, a field study containing 18 different strawberry varieties has been planted both here and at the CAES research station in Windsor, CT. Plants have been purposefully inoculated with the fungal pathogen and will be evaluated through the field season for both their susceptibility to ACR and capacity to infect neighboring plants with the disease.

5. Monitoring for Sweet Corn Insect Pest Resistance

Kelsey E. Fisher, Ph.D., and Dom Rowland

In the early 1900s, the European corn borer (*Ostrinia nubilalis*; ECB) was introduced to North America near Boston, MA, with the importation of broomcorn (*Sorghum vulgare var. technicum*) from Italy and Hungary. ECB was initially identified as a pest of corn (*Zea mays*), but was subsequently deemed a "generalist herbivore" after eggs and larvae were found on > 200 crop and weedy plant species. By 1942, ECB was distributed throughout the major corn-growing regions of North America and was the most economically impactful corn-insect pest through the 20th century. Many management strategies were attempted, but few were successful until 1996 with the commercialization of genetically modified corn encoded with *Bacillus thuringiensis* (Bt corn) in North America[5]. Bt corn expresses insecticidal crystalline (Cry) proteins in plant tissues. Ingestion of these toxins by ECB larvae in most cases results in death. Bt corn has been highly effective and widely adopted, with 85% of the corn planted in the United States engineered to express the toxins, which reduces our reliance on pesticides. Growing highly potent Bt corn in combination with non-Bt corn in close proximity delays ECB resistance evolution to this technology. Over 20 years, no cases of ECB resistance to targeted toxins ("Cry-A" and "Cry-F") were identified; however, in

2018, evidence of resistance to Cry1F was reported in Nova Scotia and continues to persist. This plot serves as a monitoring plot that will enable early detection of potential Bt resistance in Connecticut.

6. Commercial Chestnut Cultivars

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

These trees are potential commercial cultivars of orchard chestnut trees. The largest tree (grafted) is cultivar 'Colossal' (Japanese x European) which is the most frequently planted commercial cultivar in the U.S., with large acreages in Michigan and on the west coast. The other trees are seedlings from a cross of 'Colossal' x 'Lockwood' made here in 2014. We are evaluating the potential of these trees for nut production here in Connecticut.

7. Commercial Chestnut Seedlings

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

These seedling trees are open pollinated (Chinese) Dunstan chestnuts (a trademarked name). They are not a cultivar (clones from a single tree), but a variety (a type) and are widely available for sale in garden centers.

8. Control of Blight on American Chestnuts

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

These American chestnut trees were planted in 1976 when they were 3 years old. Chestnut blight cankers were treated for 4 years, from 1978 to 1981, with our biological control using hypovirulent strains of the blight fungus. The control is working well to keep the trees alive and fruiting. Some of the trees are growing better than others. We do not know which trees were from seed collected in Wisconsin and which were from Michigan. It is possible that the difference in their ability to thrive in the presence of blight and hypovirulence indicates genetic differences in resistance. The grafted tree in the center of the east row is from an "American" chestnut in Scientist's Cliffs, MD, and the original tree resisted blight for many years (it may be a European hybrid). It definitely has some resistance and is the best looking tree in the plot. Two grafted trees at the southeast corner are (*Chinese* x *American*) x *American* named cultivar 'Clapper' and have intermediate resistance to blight.

9. New Hybrid Chestnut Orchard

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

These trees are from some of our hand-pollinated crosses done in previous years and were planted as seedlings. All are hybrids of American chestnut trees and blight-resistant Chinese, Japanese, or hybrid trees. They are being grown to evaluate their blight resistance in the presence of the biological control that we assume will move over from the adjoining plot. The trees that look most like American chestnut trees and have good blight resistance will be used in future crosses for timber trees. Others will be developed as orchard trees for Connecticut growers. The paper bags on the trees cover hand-pollinated flowers from this year's crosses.

10. Remote Access Weather Station

Remote-access weather stations are deployed at the three Connecticut Agricultural Experiment Station farms located in Hamden, Windsor, and Griswold, CT. One additional unit is located at Gouveia Vineyards in Wallingford, CT, where a wine making trial for Saint Croix grapes is underway. Cumulative precipitation, growing degree days (GDD), frost events, and disease-risk assessments are recorded and/or calculated from the data collected.

11. Grapevine Demonstration Plot: Table Grapes

Washington da Silva, Ph.D.

Wine grapes and wineries are a relatively new industry in Connecticut. In the past 20 years, acreage planted to wine grapes has gone from 160 A to 620 A and the number of wineries has grown from 15 to 42, producing about 550,000 gallons of wine valued at between 12-14 million dollars per year. Three grape plots are being maintained at Lockwood farm to carry on the CAES legacy of grapevine research: **Table Grape Plot** – 12 vine rows are the seedless table grapes Canadice and Vanessa (red), Himrod (green), and Jupiter (black). The vines were planted in 2006 and bore their first (small) crop in 2008, with full crops since.

12. Grapeview Demonstration Plot: Chardonnay Wine Grapes

Washington da Silva, Ph.D.

Wine grapes and wineries are a relatively new industry in Connecticut. In the past 20 years, acreage planted to wine grapes has gone from 160 A to 620 A and the number of wineries has grown from 15 to 42, producing about 550,000 gallons of wine valued at between 12-14 million dollars per year. Three grape plots are being maintained at Lockwood farm to carry on the CAES legacy of grapevine research: **Chardonnay Wine Grapes -** Chardonnay vines are prized for the quality of the wine they produce but are very susceptible to powdery mildew. This plot was first planted to study the relationship between the onset of powdery mildew and climate in order to attune disease-risk models to our local weather conditions.

13. Seedlings of Old Surviving American Chestnuts
Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)
In the southern U.S., large surviving American chestnut trees have been found scattered through the range. When we checked the blight fungi in the cankers on these old trees, we found several new kinds of hypovirulence viruses. We believe that these trees have a little more resistance than surrounding trees, which all died of blight, and that allowed viruses from other fungi in the area to infect the blight fungus. The American Chestnut Cooperators Foundation (www.ppws.vt.edu/griffin/accf.html) has been collecting cuttings from these survivors and grafting them together in orchards where they can cross with each other. This will allow any resistance genes present in individuals to be joined together in the resulting seedlings. The ACCF sent us this collection of seedlings that we have inter-planted with seedlings from crosses of American trees here at Lockwood Farm. We will compare their winter hardiness and blight resistance with that of the European chestnut trees from Turkey and the old American chestnut trees north of them.

14. Wild Chestnuts from Turkey
Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)
These seedling trees are from six wild populations along the Black Sea in Turkey. Those from the eastern border are near the population in the Caucasus Mountains where European chestnuts (*Castanea sativa*) survived the ice ages and are genetically quite diverse. Those from the western border are much less diverse. We are growing these here to compare their winter hardiness (not very!) and resistance to chestnut blight disease (also not very!) with that of American chestnut trees and with the seedlings from "old survivors" planted next to them.

15. Questions and Answers Tent
Katherine Dugas, Rose Hiskes, Yonghao Li, Ph.D., Felicia Millett, Diane Riddle, and Gale E. Ridge, Ph.D.
This is a great opportunity to ask the experts about growing plants, testing soil, and identifying plants, plant diseases, and insects. Bring samples of soil, symptomatic plants, and insects for testing and identification. Visit the displays and pick up fact sheets about current insect and disease problems.

16. Technical Demonstration Tent
See program page 10 for a schedule of Technical Demonstrations.

17. Hamden Police Department
The Hamden Police Department's goal is to enforce the law in a fair and impartial manner, recognizing both the statutory and judicial limitations of police authority and the constitutional rights of all persons. http://www.hamdenpd.com.

18. Crown Castle Cellular Tower
Learn about the cellular transmission tower.

19. Blackie's Hot Dog Stand
We've been a popular family-owned spot since 1928, and we've been serving our signature hot dogs and burgers fresh daily since then. Our hot dogs are a custom recipe made exclusively for Blackie's by Martin Rosol's of New Britain, CT. Our famous homemade Hot Pepper Relish has delighted travelers and families, and many have tried to copy the secret family recipe – but there's nothing like it anywhere! We're proud of our deep traditions and intent on keeping it going for another 80 years! https://blackieshotdogs.com/

20. The Big Dipper
Harry Rowe
Our home-style ice cream is freshly made on the premises in small batches to ensure the finest product. In our search to bring you premium, gourmet ice cream we use the world's highest quality vanilla from the island of Madagascar and the best cocoa made from Holland. We combine farm fresh dairy cream from one of the leading dairies on the east coast with choice chocolates, nuts, berries, and the purest of flavors and extracts. With over 25 years and two generations of making ice cream, we strive to make your experience one that you will come back to for years to come. www.bigdipper.com, harry@bigdipper.com, (203) 758-3200, 75 Waterbury Rd, Prospect, CT.

21. Kids' Corner
Self-Guided Activity for All Children, Including Girl Scouts
Bring your children to the Kids' Corner to make fun crafts and learn interesting facts about insects, plants, and more! Don't miss out the opportunity to make your own insect/plant themed craft, do some coloring, play with bubbles, and grab a cold treat!

Children can come to this plot to complete an age appropriate, self-guided activity, to earn a patch of their choosing among several options. Children are directed to a few of the many exhibits where age-appropriate activities and speakers are available just for them. Once the activity is complete, return to this location to collect your patch or badge!

In addition, Girl Scouts will have the option to earn the Naturalist Legacy badge appropriate for their level of scouting. The mission of Girl Scouts is to build girls of courage, confidence, and character, who make the world a better place through a diverse range of fun, and horizon-stretching experiences. We encourage everyone to use this opportunity to learn something new about the natural world and use your new knowledge to make the world a better place. Girl Scouts of CT celebrated their 112 birthday on March 14, 2024 and is the largest organization serving girls in the state. While maintaining connection to the natural world, Girl Scouts is also proud to offer numerous STEM badges and activities.

22. Baby Pools: Low-Cost Containers for Vegetable Production in Urban Agriculture

Leigh Whittinghill, Ph.D. *Assisted by* The Plant Health Fellows Summer Interns: Emma Donahey, Christian Filteau, Elizabeth Gerbi, Andrew Medina, Katelyn Ouzts, Johanna Sampedro, Elisabeth Shin, Madeline Shin, Alexandra Vitug, and Cole Wilson.

Vegetable production in urban areas is growing in popularity, but cost, contaminated soils, and limited growing space can be a problem. The use of inexpensive containers, such as small plastic pools, could help expand production to contaminated or paved areas. Plastic pools have a lower cost per growing area than most growing containers but may also have different drainage and media needs that have not been studied yet. Students in the Plant Health Fellows summer internship program conducted an experiment 1) to compare cucumber production in pools to traditional nursery pots, 2) to find the optimal growing media/compost mixture, and 3) to optimize the drainage strategy (drainage hole and pine bark placement) for growing vegetables in pools. The students measured soil temperature and moisture content, plant growth and development, cucumber yield (number of fruits and weight), and cucumber quality based on USDA grading standards. During the first growing season (2022) unexpected results of higher germination rates, faster crop development, and higher yields in the growing media without compost were observed. There were several theories about why this occurred, but only one was supported by early results from the second growing season (2023). Heavy disease pressure in the second growing season severely affected yields. Results from the 2024 growing season should determine if yields from the 2022 growing season, or the yields and disease outcomes from the 2023 growing season will be more typical for cucumber production in small plastic pools.

23. The Effects of Management Practices on Cut-and-come-again Greens Production

Leigh Whittinghill, Ph.D., *Assisted by* Elizabeth Gerbi and Sofia Shubin

Cut-and-come-again harvesting is a practice in which a single planting of greens is harvested multiple times. This is done by removing the outer leaves, leaving the growing center of the plant intact. Depending on the desired leaf size and weather conditions, harvests can be repeated every 7-14 days, for as many as 6-10 harvests. Currently, there are no research-based management practices for nutrient management or harvesting to ensure high yields and good crop quality through multiple harvests. Several research projects are currently underway to address this gap. Two research projects examine eight different fertilizer application strategies to determine which provides better growth and nutritional quality in later crop harvests of kale and collards grown in the spring and fall. In these experiments, crop yield (weight) and crop nutritional quality (nitrates and mineral nutrients) are measured with each harvest. Runoff water is also tested for nutrients leached from pots once per week and soil is tested for nutrients at the start and end of the experiment for each season. Preliminary results suggest that increased fertilizer applications have a limited impact on yield when compared to a baseline application rate and when compared to crops grown for a single harvest. A third project is examining kale and collards grown using cut-and-come-again practices on urban and rural farms. Farms have filled out a short questionnaire about their management practices and supply a bunch of kale and/or collards for each harvest. These bunches are weighted, dried, weight again, and tested for nutrient quality (nitrates and mineral nutrient content). Farms vary in their nutrient management practices and whether they grow a single planting for the whole growing season (20 or more harvests), or plant spring and/or fall crops (7-12 harvests). Nutrient analyses of kale and collards from this project and the controlled experiments are underway.

24. Farm Equipment Used at Lockwood Farm

Lockwood Farm is a 75-acre working research farm. Here are some examples of the tractors and other equipment used for plowing, cultivating, tilling, and mowing the farm to assist the scientists in their research.

25. Experiment Station Associates

Cheryl Cappiali, ESA President

Information is available on this organization formed to help promote scientific advances at The Connecticut Agricultural Experiment Station. Visit their webpage at: http://www.ct.gov/caes/ESA or http://www.agstationfriends.org.

26. Copper-based Materials: Effective to Improve Drought Resistance in Soybean at the Reproductive Stage

Jingyi Zhou, Ph.D., Yi Wang, Ph.D., Nubia Zuverza-Mena, Ph.D., Christian O. Dimkpa, Ph.D., and Jason C. White, Ph.D.

Drought is among the most damaging climatic hazards affecting crop productivity and nutritional quality. The current study investigated the influence of Cu-based materials at mitigating drought stress in soybean during the reproductive stage in order to elucidate effects on productivity. Commercial copper oxide (CuO) nanoparticles (NPs), in-house synthesized copper sulfide (CuS) NPs, and copper sulfate ($CuSO_4$) were foliar applied at 10 mg Cu/L daily for one week to soybean that were exposed to water deficit at the onset of flowering, and plants were harvested 5 days after exposure. Drought inhibited flower production by 27% compared to the non-drought treatment. Notably, both CuS NPs and ionic Cu mitigated the drought-induced inhibition of flower production, showing a 41.7% and 33.3% improvement. CuS NPs exhibited the most positive impact on restoring shoot biomass, pod biomass, and shoot moisture content, increasing values by 53%, 96%, and 10%, respectively, compared to the drought control plants. The Cu-based materials maintained photosynthetic parameters under drought and modulated oxidative damage by enhancing reactive oxygen species (ROS)-scavenging enzyme activities. Taken together, these findings suggest that Cu-based materials modulate plant protective mechanisms against drought stress during the flowering stage, offering a potentially important nano-enabled strategy to promote biofortified climate resilient crops.

27. How Is Nanotechnology Applied in Agriculture?

Milica Pavlicevic, Ph.D. Shital Vaidya, Ph.D., Nubia Zuvreza-Mena, Ph.D., Anuja Bharadwaj, Ph.D., Terri Arsenault, Yingxue Yu, Ph.D., Itamar Shabtai, Ph.D., Joseph Liquori, Christian Dimkpa, Ph.D., and Jason White, Ph.D.

Nanoparticles are particles with dimensions between 1-100 nm. They can be either inorganic (e.g. metallic and metallic oxide, such as Ag, Cu, Fe2O3, ZnO, etc.) or organic (e.g. nanoclay, chitosan, alginate, etc.) In agriculture, nanoparticles could be used as fertilizer (enhancement of plant growth) or pesticides (to suppress bacterial and fungal infections). Same nanoparticles could have both roles. For example, mesoporous silica nanoparticles were efficient in both increasing growth of tomato plants and protecting them against Fusarium infections. Our current research deals with the production and application of "green" nanoparticles. "Green" nanoparticles are produced from biological material such as plants, without use of harmful chemicals. We synthesize "green" nanoparticles from plant waste, encouraging also circular economy. These green nanoparticles not only increase plant growth but could also improve plant nutrient composition. For example, our "green" iron and manganese nanoparticles increased the content of antioxidants, the viability of soybean plants, and improved the mineral composition, among others. These results will help us formulate "green" nanofertilizers, which would help reduce the use of chemicals and at the same, promote the production of healthier food.

28. Post-doctoral Life and Research at CAES

Rebecca M. Johnson, Ph.D., David J. Giesbrecht, Ph.D., Ravikumar R. Patel, Ph.D., Stephen J. Taerum, Ph.D. and other rotating post-doctoral representatives.

Following graduate school, many Ph.D.'s spend time as post-doctoral scientists (postdocs) while receiving additional training, publishing more research, and applying for permanent positions. The first postdoc joined the Connecticut Agricultural Experiment Station in 1992. Since then, around 75-80 postdocs have worked at CAES while authoring and contributing to many papers, advancing their fields of interest, and working for the citizens of Connecticut. In 2021 the post-doctoral scientists at the station came together to form the first CAES Post-doctoral Association (PDA), modelled off existing organizations at many universities. Since then, the CAES PDA has worked to welcome new postdocs, provide opportunities for professional development, and create a sense of community and connectedness in what is typically a highly transient group. Last fall the CAES PDA hosted their 1st Annual Postdoc Symposium featuring 6 short talks, 12 poster presentations, and Dr. John Carlson from Yale University as a keynote speaker. The CAES PDA currently consists of around 20 postdocs from at least seven different countries working across the four departments at CAES. They study topics ranging from bacterial and protist interactions with plants, the use of nanoparticles for the delivery of nutrients and genetic material, and mosquito-virus interactions.

29. The Fungus Among Us: Protecting Connecticut Strawberries from Invasive Fungal Pathogens

Nathaniel Westrick, Ph.D. *Assisted by* Melissa Trudeau and Savannah Jeffrey

Strawberry cultivation is a critical component of Connecticut's agricultural heritage and has historically been protected from a number of fungal pathogens by our cold winters that limit fungal establishment in the northeast. Unfortunately, with warming climates leading to increasingly mild winters, multiple pathogens believed to be restricted to the southern US have been detected in our state. In 2023 both anthracnose crown rot, caused by *Colletotrichum siamense*, and Neopestalotiopsis petiole blight, caused by *Neopetalotiopsis rosae,* were identified in Connecticut fields through both morphological and molecular diagnostics. Our lab is currently conducting a statewide survey to determine the prevalence of these diseases in Connecticut and variety trials to determine the susceptibility of existing cultivars are underway both here and in Windsor, CT (See Plot 4 "Strawberry Disease Resistance Trial"). A common method to control fungi in strawberries is the usage of preventative fungicides during planting, but preliminary studies suggest that both pathogens may be resistant to one of the

most common classes of fungicides, possibly driving the severity of this disease in the field. Ongoing research is assessing critical questions surrounding the resistance of these pathogens to currently used chemical fungicides, the genetic diversity of pathogen populations in the state, and the potential for the pathogen to "hide" as an endophyte in otherwise healthy-looking tissue.

30. Nonchemical Control of Mugwort (*Artemisia vulgaris*)

Jatinder S Aulakh, Ph.D.

Plastic sheet covers and wood chips are being evaluated for mugwort control at the Windsor Valley Laboratory since June 2022. Mugwort was mowed to a 2.4-inch height followed by covering with woodchips or 6-mil thick clear or black plastic sheet on June 29, 2022. Woodchips were applied in 4-inch or 5-inch depth. Data were collected on percent mugwort cover, shoot dry weight, and rhizome dry weight on May 10, 2023. The black plastic sheet was the most effective cover resulting in 92% reduction in percent mugwort cover, 89% reduction in shoot dry weight, and 93% reduction in rhizome dry weight by the end of May 2023. With the clear plastic, reduction in percent cover, shoot dry weight, and rhizome dry weight were: 52%, 36%, and 67%, respectively. The woodchip mulches also differed significantly from the non-treated control with 50% and 65% reduction in mugwort cover, 27% and 32% reduction in mugwort shoot dry weight, and 54% and 63% reduction in mugwort rhizome dry weight with 4-inch and 5-inch depth, respectively.

31. Micro-nanoscale Polystyrene Co-exposure Impacts the Uptake and Translocation of Arsenic and Boscalid by Lettuce

Trung Huu Bui, Ph.D., Nubia Zuverza-Mena, Ph.D., Emilie Kendrick, Carlos Tamez, Ph.D., Manavi Yadav, Sarah Alotaibi, Christian Dimkpa, , Ph.D. Glen Deloid, Omowunmi Sadik, Philip Demokritou, Jason C. White, Ph.D.

Micro-nanoplastics (MNPs) are widespread emerging environmental and food contaminants. The ability of MNPs to influence the fate and effects of other environmental pollutants (EPs) in edible plants is largely unknown. This study evaluated if exposure to MNPs (polystyrene, PS; 20 or 1000 nm) had an impact on the accumulation of other EPs (arsenic and boscalid, As and Bos) in lettuce, under both hydroponic and soil conditions. Nanoscale PS had a greater impact than microscale PS (μPS) on As fate; the As translocation factor from roots to the edible shoots was increased 3-fold in plants exposed to nPS (50 mg/L) and EPs. PS dose and size had a variable impact on Bos uptake and translocation. MNPs entered the roots and translocated to the leaves were successfully observed using fluorescent microscopy analysis. Pyrolysis-GC/MS results showed that in soil, the presence of EPs significantly increased the translocation of nPS in lettuce shoots from 4.43±0.53 to 46.6±9.7 mg/kg, while the concentration of μPS in the shoots remained the same regardless of the presence of EPs (ranging between 13.2±5.5 to 14.2±4.1 mg/kg). These findings demonstrate that co-exposure of MNPs with other EPs can significantly impact co-contaminant accumulation and toxicity, presenting an unknown risk to humans and other receptors.

32. Could "Nanoformulation" Serve as a Sunscreen for Plants, Shielding Them From the Impacts of Climate Change?

Raja Muthuramalingam, Ph.D., Christian Dimkpa, Ph.D., Jason C. White, Ph.D., and Nubia Zuverza-Mena, Ph.D.

Just as humans use sunscreen to shield their skin from intense sunlight and harmful ultraviolet (UV) radiation, plants also face the challenge of excessive UV exposure. UV-B rays (280-315 nm) can be particularly harmful, causing severe DNA damage, generating reactive oxygen species, and hindering photosynthesis. To counteract this stress, plants naturally produce UV-B-absorbing compounds as a form of sunscreen and initiate DNA repair mechanisms to mitigate oxidative damage. However, this natural defense mechanism can inadvertently impede plant growth by reducing nutrient levels ultimately lowering yield production. In response to these challenges, we are developing nano-scale nutrient formulations that can simultaneously protect plants from UV exposure while promoting overall plant health. Nanomaterials were formulated from a combination of the essential nutrients zinc, magnesium, manganese, and iron and labeled as "Nano-Zn-Mn-Mg-Fe." These nanocomposites were tested on lettuce plants under both normal light conditions and UV-stress conditions. Under normal light conditions, plants treated with the nanocomposites exhibited a 50% increase in biomass and developed broader leaves. Under UV stress, the nanocomposites demonstrated a damage protective effect akin to sunscreen in the treated plants, particularly noticeable in the younger leaves compared to the non-treated control. This research signifies a significant advancement in plant protection and growth enhancement strategies.

33. Investigation of Drink Adulteration with Ethylene Glycol

Carlos Tamez, Ph.D., Terri Arsenault, Micheal Ammirata, and Christian Dimkpa, Ph.D.

Ethylene glycol (ethane-1,2-diol) is an alcohol used in the manufacture of polyester fibers and in the formulation of antifreeze. Although it has a sweet taste it is toxic, and consumption of ethylene glycol can be fatal. In October 2023, as part of an investigation, DAC received a sample of artificially flavored drink suspected of being adulterated with ethylene glycol. Based on information obtained from the investigator the sample was suspected of being tainted with antifreeze. The suspect sample was exposed to ultraviolet light alongside ethylene glycol, diethylene glycol, propylene glycol, water, and antifreeze

reference samples. Upon exposure to UV light the suspect sample fluoresced similar to the antifreeze reference samples. Following this the sample was extracted using water and acetonitrile. The resulting extract was analyzed using gas chromatography mass spectroscopy. From the spectra obtained, ethylene glycol was identified at a high concentration. Additional samples of interest will also be highlighted.

34. Unseen Guardians: The Crucial Role of Protists in Soil Health

Ravikumar Patel, Ph.D., Stephen Taerum, Ph.D., and Lindsay Triplett, Ph.D.

Protists, like amoebae and algae, are microscopic soil organisms that help maintain healthy soils. Many protists use different feeding and hunting styles to consume other microbes, helping recycle essential nutrients in the soil. CAES researchers are finding that some protists even form symbiotic relationships with plant beneficial bacteria, which can help crops grow and resist stress. We are working to develop ways to apply protists to support crops in an environmentally friendly way. In this exhibit, visitors will learn about the different types of protists, and get to watch them swimming around!

35. Foliar application of copper modified Phytoglycogen: Improving yield and suppresses fusarium wilt infection in watermelon plants

Hina Ashraf, Ph.D., Chaoyi Deng, Ph.D., Christian O. Dimkpa, Ph.D., and Jason C. White, Ph.D.; Assisted by Savannah G. Phillips and D. Howard Fairbrother, Ph.D., of Johns Hopkins University

Globally, food systems are under unprecedented pressure due to fluctuating climatic conditions and escalating population. Ensuring food security requires innovative approaches. The global economic value of watermelon is substantial, driven by its widespread consumption and high demand in the market. Phytoglycogen, an analogue of amylopectin, manifests as a dendrimer-like nano-particle found naturally in diverse plant species, such as corn, rice, sorghum, barley, and Arabidopsis. Its spherical morphology and nano-scale dimensions distinguish it from amylopectin, which typically exhibits a larger, worm-like structure. The foliar application of copper-modified phytoglycogen to treat watermelon (*Citrullus lanatus* L.) grown in soil infected with *Fusarium oxysporum* f. sp. *niveum* is being evaluated as a novel management strategy. Agronomic traits such as growth, yield, metal content, photosynthetic rate, enzymatic compounds, and disease progress will be appraised within the growing period. Our research highlights that the application of modified Phyto glycogens as nano-fertilizers will be a promising strategy in nano-enabled agriculture to enhance food production.

36. Exposure of Soybean to Wildfire Nanoparticles (WFPMs) Leads to High Levels of PAHs in Soybean

Nassifatou Koko Tittikpina, Ph.D.

Wildfire events are becoming frequent across the United States. Wildfire-generated smoke is composed of particulate pollutants consisting approximately of 90% of fine particles (≤ 2.5 µm of diameter) named wildfire nanoparticles (WFPMs). These particulates can deposit onto agricultural crops, resulting in an uncharacterized exposure pathway with unknown effects and implications on both the plant and humans or animals that consume the plant. Indeed, wildfire smoke contains contaminants such as polycyclic aromatic hydrocarbons (PAHs) that are carcinogenic and linked to cardiovascular disease and poor fetal development. At the CAES, we are working with partners from Rutgers University to assess the impact of wildfire nanoparticles on crop safety. We exposed crops, namely soybean, to wildfire mimicking nanoparticles synthesized by our partners and quantified PAHs in both the particles and the exposed plants. We discovered that the levels of PAHs in the exposed crops were higher than those in the non-exposed plants, and importantly, than the levels of PAHs recommended by the relevant USA agencies. Indeed, the sum of PAH concentration in the exposed soybean range from 746.35 to 7619.94 parts per billion (ppb), although the limits recommended by the U.S. Environmental Protection Agency recommended are 1 to 4 ppb for individual PAHs. Considering that several of the detected PAHs are documented to be carcinogenic and have been linked to cardiovascular diseases and poor fetal development, exposure of food crops to WFPMs could become an issue of great concern for consumer health.

37. Effective New Deer Repellents: You Can Make Your Own!

Richard S. Cowles, Ph.D. *Assisted by* Ethan Paine and James Preste

Published reports on the extraordinary effectiveness of a newly available deer repellent, Trico Pro, which is based on the body fat of sheep, stimulated efforts to design deer repellents based upon similar principles that can be (1) less expensive, (2) legally manufactured and safely used by farmers, and (3) suitable for use on edible crops up to the day of harvest. The key to understanding the effectiveness of Trico Pro is recognizing that deer are exquisitely sensitive to odors of fats and closely related compounds, such as high molecular weight esters. Such molecules have high affinity for cuticular waxes on leaves, and once applied and dried cannot be washed off. Two trials have been completed comparing Trico Pro with a deer repellent based on a sprayable emulsion of lanolin (sheep wool grease) and one trial has been completed during the winter that additionally tested a milk-fat based repellent. Forage soybeans were completely protected from deer browsing for over 12 weeks when sprayed once when at a height of about 30 cm with a formulation of lanolin emulsified with sodium lauryl

sulfate, which is now being commercially developed. One spray with a 5% emulsion of lanolin or milk fat (a 1:1 dilution of Half & Half) on December 7, 2023, protected container grown yews from deer browsing through the entire winter and were equivalent to the Trico Pro treatment. Deer repellents based on milk fat are simple to mix and use and are based on a product readily available at the grocery store. However, they should only be used in home gardens if family members do not have milk allergies. The lanolin-based deer repellent is hypoallergenic, and so can be used safely on marketed fruits and vegetables.

38. Microbiome on Plants and Its Role in Plant Disease Management

James Standish, Naziya Nabi, Neil Schultes, Ph.D., Quan Zeng, Ph.D.

Microbiomes are the assembly of microorganisms found in a specific environment. Members of a microbiome could include bacteria, virus, archaea, fungi, and protozoa, and the microbiome members often interact with each other and with the host, forming commensal, symbiotic, and pathogenic relationships. Plants exudate extra carbon generated from photosynthesis to plant surface in the form of exudate. Such carbon becomes energy sources of various microorganisms namely the plant microbiome. Microbiomes can be found on the leaves, stems, roots, flowers, and fruits of a plant. The plant microbiome is a key determinant of plant health and productivity.

39. The Impact of Micro/nanoplastics in the Agro-food System

Yi Wang Ph.D.

The presence of micro/nanoplastics impairs human health at elevated levels. The overarching goal of this project is to examine the uptake and transformation of these contaminants by plants and their dynamics/fate in the agro-food system, and to reduce these harms by developing novel and sustainable strategies to secure food safety.

40. Mitigation of Nitrogen Loss in a Plant-soil System Through Facile Incorporation of Nanocellulose and Zinc

Paul Aikpokpodion, Ph.D., Benjamin Hsiao, and Christian Dimkpa, Ph.D.

Despite nitrogen (N) being the most important plant nutrient, only a small fraction of N is utilized by plants; the preponerance is lost through leaching, in addition to volatilization and emission. The study evaluated the use of pristine and surface -modified nanocellulose in mitigating N loss through leaching. Specifically, lettuce-cropped soil was treated with pristine or Zn-modified nanocellulose in combination with NPK compared with urea and NPK-only. The effect of nanocellulose-based treatments on N loss mitigation, crop yield and nutrient retainment in soil were evaluated.

41. Color Atlas of Fungal Spores: A Laboratory Identification Guide

DeWei Li, Ph.D., Donát Magyar, Ph.D., Bryce Kendrick, Ph.D., DSc, FRSC

This comprehensive color atlas and manual serves as a resource for identifying fungal spores. With descriptions of over 500 species and nearly 1,000 color images, it stands as an extensive illustrated manual in its field to be published in recent years. Its primary purpose is to aid in the identification of fungal allergens, allowing for the analysis of their daily and seasonal variations, as well as the composition of fungal spores present in the air. The authors have meticulously collected these images through their microscopic examinations spanning two decades, and among them are several unique and groundbreaking visuals. Furthermore, the book incorporates revised and updated scientific nomenclature for these spores, ensuring accuracy and relevance. Designed as a laboratory manual for fungal spore identification, this publication is an essential tool for professionals in environmental microbiology laboratories, aeromycologists, aerobiologists, bioaerosol scientists, indoor air quality experts, as well as graduate students conducting lab work or research.

42. A World of Viruses

Godfrey Indinda Nattoh, Ph.D. and Rebecca Johnson, Ph.D., *Assisted by* Duncan Cozens

Viruses are parasitic microorganisms that replicate within infected cells. Composed of genetic material bundled in a protein shell, viruses are relatively simple. Yet, despite their simplicity, viruses play a significant role in shaping the world we live from global economics to human health. They infect all living organisms from bacteria in deep-water vents to plants and animals. This exhibit will explore the fascinating world of viruses from their diversity and size to their medical and agricultural importance. Bring the kids and join us in constructing our own virus models.

43. Enhancing Soybean Disease Resistance and Yield with Silica-Coated Copper Sulfide Nanofertilizers

Chaoyi Deng, Ph.D., Beza Tuga, Hina Ashraf, Luyao Qin, Christian Dimkpa, Ph.D., Yi Wang, Ph.D., Christy Haynes, Ph.D., Jason White, Ph.D.

Amidst agricultural inefficiency and the looming threat of food insecurity, and with the need to increase food production by more than 70% to accommodate the projected global population exceeding 9 billion by 2050, innovative strategies are imperative. In this context, soybean emerges as a crucial crop due to its high protein content and versatile applications in food, feed, and industrial sectors. However, soybean cultivation faces significant challenges from Fusarium diseases, which

can severely impact yield and quality. The infiltration of seeds with different nanoscale fertilizers has demonstrated significant potential to increase disease resistance and yield. In the current field study, the application of a silica-coated copper sulfide nanofertilizer into soybeans by seed infiltration is being investigated. Various agronomic parameters, nutritional content, yield, and disease damage will be evaluated over the growing season. Our study demonstrates the potential of nanomaterial-assisted fertilizers for sustainable agriculture. Further research will focus on optimizing the application process and evaluating long-term effects.

44. Mycorrhizal Inoculation in Urban Trees

Susanna E. Keriö, D.Sc. *Assisted by* Carlin Eswarakumar

Tree planting is a critical for urban tree canopy maintenance and for the mitigation of the impacts of climate change in cities. However, various abiotic and biotic stress factors affect the survival of newly planted trees, with 5-year mortality estimated to be 6%. Due to the impacts of abiotic and biotic stress on urban tree health, improving tree stress resilience is paramount. It has been estimated that even 90% of urban tree health issues are related to soil conditions. Therefore, management approaches that improve root health may effectively improve tree stress resilience. One approach to improve the health of newly planted trees is to inoculate them with mycorrhizal fungi. Mycorrhizal fungi colonize plant roots and form networks of fine hyphae that explore a greater soil volume, thus improving the uptake of water and minerals from the soil. Benefits of mycorrhizae for trees are widely accepted, but it is unclear how useful and how effective mycorrhizal inoculation is for trees growing in field conditions. This exhibit presents results from a project that focuses on quantifying the impact of mycorrhizal inoculation on urban tree health in Connecticut. In partnership with tree planting programs and towns in Connecticut, we have performed mycorrhizal inoculations on urban trees planted in 2021-2023. The selected trees are located in parks, front yards, and in the public-right-of-way on streets. The studied tree species include red maples, oaks, eastern red buds, flowering dogwoods, and flowering cherries. During the growing season of 2024, we have monitored the response of the trees to mycorrhizal inoculation, and will report on these preliminary findings. Our long-term goal is to provide information on site factors that affect both tree health and the success of mycorrhizal inoculation, and how the interaction of site conditions and tree species affect the benefits of mycorrhizal inoculation.

45. Potential For Biological Control of Spotted Wing Drosophila (*Drosophila suzukii*)

Claire E. Rutledge, Ph.D.

Spotted wing drosophila is an invasive relative of the common fruit fly we all get in our kitchens from time to time. However, this insect has a critical adaptation which turns it from a nuisance to a serious economic pest: the females lay their eggs in ripe fruit, not decaying fruit. When SWD first arrived in Connecticut in 2011, it devastated the fall raspberry crop. Since then, growers have been forced to increase chemical protection of raspberries, blueberries, grapes and other small fruit. No one enjoys fruit with maggots. Last year, a parasitoid *Ganapsis brasiliensis* S1, a tiny wasp that kills the larval SWD was approved for release in the United States after a concerted many-year effort to find an effective, species-specific biological control agent. While no releases of the parasitoid have been north of Delaware, parasitic wasps were seen last fall in raspberries in both Massachusetts and Connecticut. This summer we have surveyed raspberry and blueberry crops in both states to determine the identity, phenology and abundance of these parasitoids. These results will inform the further progress of this important biological control program.

46. The Pavilion at Lockwood Farm

See program page 10 for a schedule of short talks under the pavilion.

The pavilion at Lockwood Farm was commissioned by the Experiment Station's Board of Control with funds provided by the William R. Lockwood Trust. Completed in May of 2016, it was designed and built by Steven Strong of Strong Timber Frames, East Hampton, CT. All wood products used in construction of the pavilion are Connecticut grown. The posts, beams and walls are eastern white pine, grown and harvested from Babcock Pond Wildlife Management Area in Westchester, CT. The pegs and splines are white oak, harvested from the Strong's 50-acre farm in East Hampton, CT. The pavilion is constructed using traditional timber framing post and beam techniques with large heart sawn timbers. The pavilion design features a large cupola with window and louver units that were constructed from the edges of the timbers. It functions to allow natural light and ventilation which provides an open feel in the interior of the building.

47. The 2023 Connecticut Oak Mast Surveillance Program Results

Joseph P. Barsky *Assisted by* Zachary Bates

The Connecticut Oak Mast Surveillance Program monitors mature trees (300 red oak group, 275 white oak group) across Connecticut and annually assesses acorn crop abundance during a 2-week period in August. Despite continued widespread acorn crop failure for both red and white oaks throughout the state, Middlesex County experienced an average white oak acorn crop for the first time since 2016 and lower New London County experienced a good red oak acorn crop.

A late season frost on May 18, 2023 throughout New England may have negatively impacted pollination of oak flowers and leaf emergence this year, contributing to this year's widespread white oak acorn crop failure, and may potentially impact the 2024 red oak acorn crop. In addition to current challenges facing oak trees, widespread spongy moth (*Lymantria dispar)* outbreaks have contributed to acorn crop failures and oak mortality throughout the region.

Oaks are a foundational component of many forested ecosystems in southern New England and their health is directly correlated with the health of the forests. Further, they are a primary fall food source for over 80 wildlife species in our area.

48. Bird & Butterfly Garden

Jeffrey Fengler and Lisa Kaczenski-Corsaro

The Bird & Butterfly Garden creates several favorable habitats for our native birds, butterflies, and pollinating insects and helps us determine which plants may work best in southern Connecticut gardens. At this time of year, the garden is at its peak performance with plants thriving in the garden and meadow. Plant labels are placed near the plants in the garden to provide the botanical and common name. Throughout the day, we update our list of birds, butterflies, and moths spotted in the garden. The Bird & Butterfly Garden at Lockwood Farm is listed in the "Nature Conservancy Open Days Directory for New England". Do you have a butterfly garden or would like to start one? Experiment Station staff members can provide you support by answering your questions and suggesting ways for you to enjoy a butterfly garden small or large on your patio or in your yard.

49. The Public Health and Entomology Tent

a. Statewide Monitoring Program for Mosquito-borne Viral Diseases in Connecticut

Philip Armstrong, Ph.D., John Shepard, A. Gloria-Soria, Ph.D., Angela Bransfield, Michael Misencik, Tanya Petruff

Mosquito-borne viral diseases constitute an annual threat to human health in Connecticut. A comprehensive surveillance program complemented by science-based controls and timely public outreach are the most effective ways to protect the public and reduce the risk of human disease. The Connecticut Agricultural Experiment Station (CAES) maintains a network of 108 mosquito-trapping stations in 88 municipalities throughout the state. The surveillance program monitors the types, numbers and locations of mosquitoes and tests them for the presence of viruses that can cause illness including West Nile virus (WNV) and eastern equine encephalitis virus (EEEV). To date, more than 5 million mosquitoes representing 48 different species have been collected, identified, and tested since 1997. A total of 3,164 WNV isolations have been recovered from 24 different mosquito species and a total of 645 isolations of EEEV have come from 21 species of mosquitoes. WNV has been detected every year since its introduction into Connecticut in 1999, virus activity peaks from July-September and is most frequently detected in densely populated areas of lower Fairfield and New Haven Counties, and Hartford metropolitan area. Seasonal transmission of EEEV occurs sporadically and the focal areas are located near forested swamps in southeastern Connecticut. Further information on weekly test results and annual summaries for previous years can be found on the CAES web site (https://portal.ct.gov/caes/mosquito-testing/introductory/state-of-connecticut-mosquito-trapping-and-arbovirus-testing-program).

b. Treating White-Tailed Deer For Tick Management in Connecticut

Scott C. Williams, Ph.D. and Megan A. Linske, Ph.D. Assisted by Jessica Brown, Ph.D., Heidi Stuber, Jamie Cantoni, Natalie Bailey, Hailey Carter, Claire Turner, and Melissa Tian

White-tailed deer and white-footed mice play critical roles in blacklegged tick ecology both in their reproduction and pathogen transfer, respectively. If we can figure out a strategy to target ticks on these hosts during the time of year, they are known to be feeding on them, we can effectively make these animals tick killing machines instead of reproductive hosts. But to do so, we need to be sure that any product introduced is going to be safe for them and safe for the environment. As a result, we are testing the oral delivery of products meant to kill parasites including ticks on cattle to white-tailed deer and a fipronil-based bait on white-footed mice in Connecticut. Our goal is to see if we can get both species to consume the products and determine if we can reach levels of active ingredient in the animals shown to be lethal to ticks in previous efforts. Over a five-year period, we will feed treated bait to deer and mice in Woodbridge and Bethany, CT. We will capture deer and trap mice to investigate tick abundances and determine active ingredient levels within the blood. A strategy such as this has potential to reduce, if not eliminate ticks over large areas and reduce public exposure to ticks and tick-borne pathogens.

c. **Monitoring Ticks and Tick-borne Pathogens to Better Guide Public Health Action in Connecticut**

Goudarz Molaei, Ph.D., *Assisted by* Noelle Khalil, Lorelei Sandland, Abigail Chang

Native and invasive tick species pose a serious public health concern in the United States. Over the past two decades, the rate of novel tick-borne pathogen discoveries has accelerated, and the geographic ranges of medically important ticks have expanded. As a result, an increasing number of communities are at risk of exposure to ticks and

tick-borne pathogens. Tick-borne diseases comprise more than 90% of nationally notifiable human vector-borne disease cases in the U.S. The reported tick-borne disease cases have increased from 22,527 in 2004 to 71,346 in 2022, for a total of 783,227, but the actual case number is substantially higher. Rising global temperatures, anthropogenic and natural environmental changes, and accelerated trade and travel, among other factors, are facilitating the introduction of invasive ticks and tick-borne diseases into new areas and influencing the rate and extent of their range expansion. The majority of tick-borne disease cases are associated with the blacklegged (deer) tick, which serves as a vector for several pathogens, including those responsible for Lyme disease, Borrelia miyamotoi disease, anaplasmosis, ehrlichiosis, babesiosis, and Powassan virus (POWV) disease. Monitoring tick populations in Connecticut has historically been conducted by the CAES-Tick Testing Laboratory (CAES-TTL) within the framework of a passive tick and tick-borne disease surveillance program. The CAES-TTL was established in 1990 and mandated by the state legislature to test blacklegged (deer) ticks for the causative agent of Lyme disease. In 2015, the program was expanded to include testing for the disease agents responsible for babesiosis and anaplasmosis, and in 2023, testing for Borrelia miyamotoi and POWV was initiated. Historically, the CAES-TTL has received approximately 3000 ticks annually from residents of Connecticut, health departments, and healthcare providers. However, in recent years, the number of submitted ticks has reached nearly 6,000 per year. All submitted ticks are identified to species and examined for engorgement status, and blacklegged ticks are tested for evidence of infection with tick-borne pathogens. In 2023, the CAES-TTL received nearly 5,743 ticks, of which 4,230 (73.7%) were blacklegged ticks, 1,205 (21.0%) were American dog ticks, 292 (5.1%) were lone star ticks, 14 (0.2%) were longhorned ticks, and 2 (0.03%) were Gulf Coast ticks. Of the 4,122 engorged nymphs and adult female blacklegged ticks that were tested in 2023, 26.5%, 2.4%, and 8.3% tested positive for the causative agents of Lyme disease, anaplasmosis, and babesiosis, respectively. In addition, up to 4.2% of these ticks were identified as positive for two or three of these disease agents simultaneously. In 2023, the CAES-TTL reported the first discovery of an autochthonous human disease case of Rickettsia parkeri spotted fever transmitted by the Gulf Coast tick, an important discovery in the northeastern United States that highlights the growing risk of tickborne diseases in an area already plagued with Lyme disease and at least five recognized tickborne diseases.

50. Assessing Pollinator Response to Ecotype Native Plants

Ms. Tracy Zarrillo, *Assisted by* Connor Grace, David Mantack, and Aidan Castricone

State and federal agencies, land trusts, private landowners, farmers, and pollinator conservation groups are investing time and money creating pollinator habitat and meadows throughout Connecticut. One aspect of many of these projects is the use of native plants. In response to demand for locally adapted native plants, ecotypic flower seed is being developed as a new commodity in Connecticut. Ecotype seeds are seeds grown from a parent stock that have genetically evolved over time to be adapted to the environment of a particular ecoregion. Ecotype seeds could be used by nurseries, farmers, state agencies, land trusts, landscapers, and private landowners to help increase native habitat in Connecticut. However, we have limited information about which bee species are supported by these native plants, or if the bee species are equally attracted to these native plants throughout the state. Some of the native flower species being grown for ecotype seed are hosts plants of specialist bees. Specialist bees can only use pollen from one plant species, one plant genus, or one plant family. Some specialist bee species, such as the squash bee, *Peponapis pruinosa*, are ubiquitous in the Connecticut landscape and consequently will show up wherever their host plant is grown. In this experiment, I am exploring how readily three specialist bee species, *Melissodes denticulata, Dufourea monardae*, and *Osmia distincta,* find their associated host plants, *Vernonia noveboracensis*, *Monarda fistulosa*, and *Penstemon digitalis* respectively. I will also document the other bee species in the landscape that are using these host plants. Knowing which bee species are attracted and where they can be supported by certain flower species can help guide flower species selection for commercial development. The ecotype seeds for this project were generously donated by The Hickories Farm in Ridgefield, CT. The seeds grown out from this experiment will be distributed to other state agencies for use in habitat restoration projects.

51. Office of Aquatic Invasive Species

Gregory Bugbee, Jeremiah Foley IV, Ph.D., Summer Stebbins, and Riley Doherty *Assisted by* Briana Brody, Ella Nastri, Madison Manke, and Maddie Watts

Non-native invasive plants are causing ecological and economic degradation to Connecticut lakes and ponds. Species such as hydrilla, Eurasian watermilfoil, fanwort, and water chestnut displace native plants, interfere with recreation, reduce property values, and can harbor harmful algae. The Department of Environmental Science and Forestry houses the Office of Aquatic Invasive Species (OAIS), which formalizes Connecticut's commitment to protecting aquatic ecosystems from these threats. Addressing Connecticut's invasive aquatic plant issues requires routine monitoring. OAIS has conducted over 450 aquatic plant surveys since 2004. Over 100 plant species have been documented of which 15 are considered invasive. 56% of the waterbodies contain one or more invasive species. In 2018, we identified a new strain of hydrilla in the Connecticut River, considered one of the worst invasive plant species. OAIS surveys have since documented nearly 1000 acres of the plant in the river from Agawam, MA to Long Island Sound. Last year, OAIS found the Connecticut River strain of hydrilla had spread to

six lakes and ponds. OAIS is working closely with the United States Army Corps of Engineers (USACE), the Connecticut Department of Energy and Environmental Protection, and other partners to determine the best prevention and management strategies for this unique strain of hydrilla. OAIS offers assistance in the identification, surveillance, and management of aquatic vegetation. OAIS researchers study novel aquatic plant management techniques including herbicides, biocontrol, and survey technology. At this plot you will see our research boats, state of the art surveillance technology, and the equipment we use to conduct aquatic plant surveys. In addition, there will be live specimens of invasive plants on display to hone your identification skills. A researcher will be available to discuss our program and answer questions about Connecticut lakes and ponds.

52. Challenges for Hemp Growers

Terri Arsenault, Richard Cecarelli and Anuja Bharadwaj, Ph.D.

CAES began testing hemp in 2019 following the legalization of the growing of hemp with passage of the Agricultural Improvements Act in December of 2018. The bill allowed growing *Cannabis sativa* as long as it has <0.3% total delta-9 THC, which is federally legal and referred to as hemp (versus marijuana). While hemp cultivars are predominantly CBD, they will contain THC at a ratio of about 25:1, with the ratio dependent upon the genetics of the plant. This means that the maximum CBD is around 8%, depending on the measurement uncertainty of the testing. However, the advertised maximum CBD for many cultivars is around 12%, and there is a notable escalation in CBD content as plants mature. Gowers should be mindful of the rapid escalation in CBD\THC content as plants mature and may need to harvest prior to full maturity to prevent crop embargoes. Also, while marijuana is legal under CT state law, hemp is federally legal and has separate growing and harvesting requirements. Lastly, evidence suggests that pesticides such as Cu applied to hemp for plant protection goals can alter the THC/CBD levels, which may accentuate the metabolite escalation during the peak maturity stage.

53. Chestnut Species and Hybrids

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

These trees are part of the large collection of species and hybrids of chestnut maintained by The Experiment Station. Great differences can be seen in chestnut blight resistance, Asian chestnut gall wasp resistance, form, and nut production. Hypovirulent strains of the blight fungus help protect the trees from lethal cankers (see Control of Blight on American Chestnuts). Plants of all seven species of chestnut are growing here. One seedling from the Caucasus Mountains of Russia (a true European chestnut), planted in 1994, has not survived well through our Connecticut winters. Commercial European chestnut trees from Northern Turkey have also done poorly. Two trees of the chinquapin native to northern Florida are planted across the road from an Allegheny chinquapin from Ohio. The original tree (the “ortet”) of the cultivar ‘Lockwood’ is at the southwest corner of the plot.

54. Healthy Plants—Healthy Business: Support of The Green Industry by Inspection

Victoria Lynn Smith, Ph.D., *Assisted by* Tia Blevins, Jeff Fengler, and Jacob Ricker

We work to assure the quality of the agricultural products leaving the state and to maintain the health of forests and Connecticut’s agricultural industry. In 2023, the Office of the State Entomologist completed registration and inspections for 190 nursery growers and dealers of plants and plant products. Over 448 certificates of export were issued for plant commodities moving out of country, to 28 destination countries. Over 71 certificates of export were issued for plant commodities moving out of state, to 11 destination states or US territories. Nearly 700 beekeepers registered 6,750 hives, and over 1,000 of these were inspected for diseases of honeybees. In addition, surveys, supported by the Cooperative Agricultural Pest Survey and the Plant Protection Act, were conducted for a variety of exotic pests and diseases, including many non-native moths and wood boring insects. Box tree moth, a federally-regulated pest, was found at one location in CT, surveys continue for this pest. The health of our forests was assessed by aerial survey and by winter-time gypsy moth egg mass survey. Our goal is to safeguard agriculture and forests of Connecticut through surveys to detect infestations, through monitoring of the health and vitality of the forests, and through inspection and registration of commodities and producers to assure their fine quality.

55. Improving Soil Water Retention Characteristics with Compost

Itamar Shabtai, Ph.D., *Assisted by* Nina Passaro and Matilda Kutchinski

Kale is a high-value crop with high nutrient content and relatively quick growing times, making it a valuable crop in urban and small-scale agriculture where space is limited, and food security is a motivational factor. Although ample plant available water is critical for crop yield and quality, irrigation on small-scale farms is typically not synchronized with plant demands because soil or plant water sensing technologies are usually not utilized. Therefore, improving the intrinsic capacity of soils to hold and provide water to plants, especially in times of high evapotranspiration demand, is critical. One potential method for improving the water holding properties of soil is adding organic amendments, e.g., compost, leaf mulch, and manure. While organic amendments are already commonly added to urban and small-scale farm soils, they are added for their nutrients, and the amount added is based on their nutrient content. It is therefore unclear whether prevalent organic

amendment practices provide benefits for plant available water. We have set up field plots at Lockwood farm to better understand the benefits of organic amendments for plant available water capacity, and to use plant drought stress indicators as a tool for evaluating the effects of changes to plant available water capacity on crop yield and quality.

56. The Rock

This rock is (technically) a Glacial Boulder composed of diabase. It was moved by flowing ice from its place of origin and is therefore also known as a Glacial Erratic. The boulder probably fell onto the top of the glacier oozing its way down past the Sleeping Giant's head during the waning stage of the last continental glaciation. It was deposited here, near the toe of the waning glacier, onto "till", an unsorted mass of sandy or silty material mixed with rounded pebbles and boulders that had been pushed in front of, or under, the glacier, and deposited as the ice melted. Most of the boulders around the area, such as those in the nearby stone walls, are rounded and their surfaces have been ground smooth by abrasion beneath the glacier. Diabase has a fine crystalline texture, having been pushed up as magma close to the surface where it cooled quickly. The "trap rock" of this region is either diabase, or its compositional equivalent basalt that was extruded onto the surface as lava flows that form topographic "trappa" or "trappe" (steps or stairs).

57. Asian Chestnut Gall Wasp on Chestnut

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

Many of the chestnut trees here at Lockwood Farm are heavily infested with Asian chestnut gall wasp (*Dryocosmus kuriphyllis*). The insect was first detected in CT in 2011 but has done serious damage to commercial orchards in the mid-west and in Italy. We have been making crosses of susceptible trees with species of chinquapins which seem to have good resistance to this insect, and some are planted here. There are more wasp galls on some of these trees than on others, and we will continue to evaluate the effect of these galls on the growth and nut production of the trees.

58. Hybrid Elm Trees

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

The late Eugene Smalley spent his whole career at the University of Wisconsin breeding elm trees for resistance to Dutch Elm Disease and for the tall, vase-shaped form of American elm trees *(Ulmus americana*). The problem with this kind of breeding is that American elms have four sets of chromosomes, and all the other species of elm have two sets. They bloom at different times, but stored pollen can be used to make crosses. In 1992, Dr. Smalley sent us trees of Chinese elm (*Ulmus parvifolia*) and some of his successful crosses. Mortality has been high, but some of the trees still survive. A few of them look like good replacements for American elms as street trees.

59. Rocky Hill American Chestnut Trees

Sandra Anagnostakis, Ph.D. (Emeritus), *Assisted by* Pamela Sletten (Retired)

Seed collected from selected American chestnut trees in a woodlot in Rocky Hill, CT in 1985 grew into the trees planted here. They are used as female parents in our crosses and are being treated with hypovirulence (see Control of Blight on American Chestnuts) to keep them alive.

60. Grapevine Demonstration Plot: Hybrid and Vinifera Grape Cultivars

Washington da Silva, Ph.D.

Wine grapes and wineries are a relatively new industry in Connecticut. In the past 20 years, acreage planted to wine grapes has gone from 160 A to 620 A and the number of wineries has grown from 15 to 42, producing about 550,000 gallons of wine valued at between 12-14 million dollars per year. Three grape plots are being maintained at Lockwood farm to carry on the CAES legacy of grapevine research: **Hybrid and Vinifera Grape Cultivars Plot -** This vineyard was planted in late spring, 2008. Some of the newer cultivars were selections from breeding programs at Cornell University and the University of Minnesota and have not yet been released. Others are newly available cultivars from cool and cold climate areas of Europe.

61. Testing of Biopesticides on Fire Blight Management

James Standish, Naziya Nabi, Quan Zeng, Ph.D.

Fire blight is a devastating bacterial disease to apples and pears. As the pathogen enter the hosts through open flowers, an effective approach to control this disease is through spraying antibiotics during flowering season. We annually test naturally isolated beneficial microbes, as well as commercially available disease control products for fire blight control efficacy. Trees were inoculated with the pathogen, and were treated with various materials, disease symptoms and incidences were evaluated.

62. Mowing for Monarchs

Kelsey E. Fisher, Ph.D., and Karena Kulakowski

Monarch butterflies (*Danaus plexippus*) are a charismatic lepidopteran species, known for their characteristic orange and black coloration, annual multi-generational migration across North America, and obligate host relationship with milkweed (*Asclepias* spp.). Since the 1990s, a significant population decline has been observed due, in part, to land conversion that diminished breeding habitat with milkweed in the United States. The approximate 1.6 billion stems of milkweed in the summer breeding range are estimated to support an overwintering population of 3.2 hectares of monarchs in Mexico. To support a resilient overwintering population in Mexico (a long-term average of 6 hectares of overwintering monarchs), an additional 1.3 billion milkweed stems need to be established within the monarchs breeding range. A twenty-year strategic plan for monarch butterfly habitat establishment is underway from 2018-2038. However, because of the challenging cost to support the 'boots-on-the-ground' effort required to reach this goal, it is imperative that new habitat establishment practices are designed to maximize monarch survival, longevity, and realized fecundity. Integrating aspects of lepidopteran behavior that enhance oviposition rates and larval survival into conservation plans could increase the overall impact of the efforts. Monarchs seem to favor young, succulent, and lush milkweed for oviposition, and larvae may prefer and have higher survival rates when fed new growth (preliminary data). The apparent preference for new growth provides an opportunity to implement management strategies that support monarch behavior. Evidence suggests that mowing milkweed encourages milkweed to produce new vegetative leaves and helps support monarch reproductive outputs. Current recommendations suggest the timing of mowing should complement monarch population survival by minimizing larval mortality. In CT, although some arrive earlier, adults appear in high numbers in July, later than seen in other parts of the country and larvae feed on milkweed throughout August during its reproductive stage when foliage is less nutritious. Here, we are comparing a mowing treatment in June to milkweed that was not mowed on oviposition and larval survival rates.

63. New England Ecotypes of American Elms (*Ulmus americana*) and Sugar Maples (*Acer saccharum*)

Robert Marra, Associate Scientist in Forest Pathology, Department of Plant Pathology & Ecology

This "common-garden" plot, interplanted with sugar maples and elms, was planted in 2018 with 5-year-old saplings obtained from New England Wetland Plants of Amherst, MA. Having originated from seed wild-collected in New England, these trees represent and demonstrate the abundant phenotypic and genotypic diversity of these native species still extant in wild forests. The plot is being maintained for future investigations into the efficacy of copper-nanoparticle injections against fungal vascular wilts: Dutch elm disease, caused by *Ophiostoma novo-ulmi*; and sapstreak disease of sugar maples, caused by *Davidsoniella virescens*. Both of these pathosystems can also serve as a proxy for a study that cannot be conducted outside of a quarantine facility: oak wilt, caused by the fungus *Bretziella fagacearum*, a devastating disease that kills members of the red-oak group (e.g. *Quercus rubra*) in a single season. The trees in this plot will need to be at least 4" dbh (diameter at breast height) before injections can be administered. Following injections, trees will be challenged through artificial inoculations with the appropriate pathogens. Two things to observe here now: (1) the difference in growth rates between elms and maples; and (2) the wide variation in form, particularly among the elms.

64. The Fight Against Potato Viruses

Washington da Silva, Ph.D. and Richard Cecarelli. *Assisted by* Raja Muthuramalingam, Ph.D., Rania Eltanbouly, Ph.D., and Francisco Faggion, Ph.D., and by the graduate students Juliana Milagres and Talison da Costa

Potato (*Solanum tuberosum* subsp. *tuberosum*) is the fourth main staple crop in the world, behind rice, wheat, and corn. It is grown on all continents and because it is a vegetatively propagated crop, potato is particularly vulnerable to destructive viruses such as potato virus Y (PVY), potato leafroll virus (PLRV), and potato mop-top virus (PMTV). Endemic and emerging viruses are becoming a major threat to smallholding farms because of the negative effects on yield and quality that they induce on the marketable product. In Connecticut, like much of New England, potato is planted primarily for the local market where quality is paramount and any blemishes reduce marketability and farm value, directly impacting growers's income. The da Silva Lab at CAES is working on new sustainable technologies to help in the fight against potato viruses. In his recent work, Dr. da Silva has identified specific ribonucleic acid (RNA) molecules that induce RNA interference (RNAi), an evolved plant defense mechanism that we are seeking to activate or enhance, in plants and prime plants to successfully resist viruses. His team is now developing nanocarriers to deliver those RNA molecules into potato plants to activate RNAi and induce a "vaccination effect" against destructive potato viruses. The several potato varieties planted in the Lockwood farm will be used to test this virus control strategy. (Identical to Plot 3)

65. Cheshire and Hamden Pollinator Pathways

Joy VanderLek

Cheshire Pollinator Pathway is partnering with Hamden Land Trusts Pollinator Pathway to help promote native plants in the local landscape, raising awareness for all sizes and types of property-whether you have a yard, a patio or a planting pot. Everyone can help pollinators. Cheshirepollinatorpathway.org, Joyvlek@gmail.com, 203-623-4027.

66. Connecticut Christmas Tree Growers Association

Lisa Angevine-Bergs

The Connecticut Christmas Tree Growers Association is a non-profit membership organization established in 1960. CCTGA is dedicated to the development of the Christmas tree industry in the state of Connecticut. Representing over 200 members, CCTGA focuses on the production and marketing of top-quality Christmas trees as well as providing consumers with information about local tree farms, where to purchase CT Grown Christmas trees, and how to care for them. ctchristmastree.org, executivedirector.cctga@gmail.com, 860-601-5906.

67. Connecticut College Arboretum

Scott D'Agostino

The Arboretum, established in 1931, is a signature feature of Connecticut College. Today it encompasses 750 acres, including the landscaped grounds of the College campus as well as the surrounding plant collections, natural areas and managed landscapes. The Arboretum offers visitors a chance to explore a diverse collection of native plants and natural habitats or simply wander and enjoy the beauty of this precious natural resource. Taking a self-guided tour (offered May-October) is an excellent way for first-time visitors to experience many interesting features in the Native Plant Collection. Approximately 2,500 trees, shrubs and vines native to eastern North America and hardy in southeastern Connecticut are labeled with scientific names and accession numbers. The various species take turns displaying their beauty throughout the seasons: shadbush and willows in April; dogwood and azaleas in May; mountain laurel and magnolias in June; giant rhododendron, sourwood, and sweet pepperbush in July; Franklin tree in September; brilliant autumn foliage in October; evergreens and conifers year-round. Spring blooming wildflowers and late summer blooming perennials add color and pollinator habitat across the landscape. The Arboretum is open to the public, free of charge, every day of the year from sunrise to sunset. For more information, please feel free to contact sdagostin@conncoll.edu (860) 439-2144 or visit our website at www.arboretum.conncoll.edu.

68. Connecticut Department of Agriculture

Rebecca Eddy

The Connecticut Department of Agriculture mission is to foster a healthy economic, environmental, and social climate for agriculture by developing, promoting, and regulating agricultural businesses; protecting agricultural and aquacultural resources; enforcing laws pertaining to domestic animals; and promoting an understanding among the state's citizens of the diversity of Connecticut agriculture, its cultural heritage, and its contribution to the state's economy. For more information, visit www.CTGrown.gov, rebecca.eddy@ct.gov, 860-713-2500

69. Connecticut Farm Bureau Association

Joan Nichols

The Connecticut Farm Bureau Association is a non-profit membership organization dedicated to farming and the future of Connecticut farms. Representing the interest of nearly 2,500 members, CFBA serves its members by advocating for agriculture. Representing the cross-section of Connecticut agriculture, CFBA focuses on the issues that keep farm families productive. Display is focused on educating visitors about Connecticut agriculture and Connecticut Farm Bureau. cfba.org, joann@cfba.org, 860-768-1100

70. Connecticut Federation of Lakes

Rebekah White

The Connecticut Federation of Lakes (CFL) is the Voice of Connecticut Lakes. Connecticut Lakes need a voice to represent these important inland water bodies so they can become and/or remain the healthy, desirable natural resources our families and friends deserve. The CFL is a partner, resource, a sounding board, a clearinghouse, and an advocate in matters as they pertain to CT lakes. The CFL wants to help you in your efforts to protect your lake, pond and/or watershed to be healthier now and in the future. www.ctlakes.org, Admin@ctlakes.org

71. Connecticut Forest and Park Association (CFPA)

Elizabeth Merow, Education Director

The Connecticut Forest & Park Association (CFPA) connects people to Connecticut's forests, parks, and Blue-Blazed Hiking Trails, and ensures these special places are protected and well-managed for future generations. CFPA inspires active, lifelong engagement with Connecticut's abundant and well-managed forests, parks, and trails by building a vibrant and diverse conservation community, including individuals and families, educators, community leaders, and volunteers. CFPA is a nonprofit organization that relies on members and supporters to carry out its mission. www.ctwoodlands.org, emerow@ctwoodlands.org, 860-346-8733

72. Connecticut Invasive Plant Working Group

Rose Hiskes

The mission of the Connecticut Invasive Plant Working Group is to gather and convey information on the presence, distribution, ecological impacts, and management of invasive species; to promote uses of native or non-invasive ornamental alternatives throughout Connecticut; and to work cooperatively with researchers, conservation organizations, government agencies, green industries, and the general public to identify and manage invasive species pro-actively and effectively. www.cipwg.uconn.edu, rose.hiskes@ct.gov, 860-683-4977, x1

73. Connecticut Land Conservation Council
Aaron Lefland
The Connecticut Land Conservation Council is the only statewide service provider and voice for all Connecticut land trusts. CLCC is a leader in advocacy and policy, education and training, and technical assistance to empower Connecticut's 120+ land trusts and ensure the long-term viability of land conservation efforts in the state.

Since its formation in 2006, CLCC has grown into one of the most effective land trust service associations in the country, offering a wide range of programming and services – from traditional capacity building, training, and education to new and creative opportunities for land trusts to better connect to one another and their communities for greater conservation, economic, and social impact. www.ctconservation.org , alefland@ctconservation.org, 860-852-5512

74. Connecticut Professional Timber Producers Association
Kit Serafini
The Connecticut Professional Timber Producers Association is a non-profit organization representing the forest products industry of CT. Our membership works to enhance the image and understanding of the forest products profession in Connecticut through public outreach programs, education, and a commitment to professionalism amongst its members. www.timproct.org, info@timproct.org, 860-948-0432

75. Connecticut Tree Protective Association, Inc.
Cathy Dvorsky
The Connecticut Tree Protective Association is a non-profit organization that supports arboriculture in the State of Connecticut. This association was established to accomplish the following goals: a.) promote the protection and care of trees in the State of Connecticut, b.) to advocate for beneficial legislation as it relates to trees, c.) to sponsor meetings devoted to the presentation and exchange of scientific data and general information in the field of arboriculture, d.) to foster research in the field of arboriculture, e.) to encourage a greater interest in planting trees and how to plant, and nurture them properly and f.) to promote good fellowship and ethical practices in the arboricultural profession. www.ctpa.org, cathy@ctpa.org, 203-484-2512

76. CONN-OSHA
Catherine Zinsser
The Connecticut Department of Labor's Division of Occupational Safety and Health is referred to as CONN-OSHA. CONN-OSHA administers Connecticut's Public Employer Only State Plan and enforces occupational safety and health standards as they apply to all municipal and state employees. As a State Plan state, CONN-OSHA adopts and enforces standards that are at least as effective as the federal requirements. CONN-OSHA also offers comprehensive training and education programs covering all aspects of occupational safety and health. Provided at no charge, these programs are designed to be utilized in conjunction with both consultation and enforcement activities. https://portal.ct.gov/dol/divisions/conn-osha, catherine.zinsser@ct.gov, 860-916-7376

77. CT DEEP Pesticide Management Program
Zachary Donais
The Connecticut Department of Energy & Environmental Protection (DEEP) Pesticide Management Program's main goal is to prevent adverse human health or environmental effects from the misuse of pesticides. We work with all people, products, permits, and businesses that are related to pesticides and arboriculture and make sure that they are properly certified and knowledgeable in the work they are doing. We would be happy to answer any questions about pesticides or help anyone looking to get certified! https://portal.ct.gov/deep-pmp, zachary.donais@ct.gov, 860-424-3326

78. CT Farmland Trust
Elisabeth Moore
CT Farmland Trust is the only statewide nonprofit in the state dedicated to the protection of agricultural land. Since its founding in 2002, CFT has protected 75 farms and assisted its partners in conserving an additional 1,100 acres. CFT works with farm owners to permanently protect their land often in partnership with the CT Department of Agriculture, USDA-NRCS, municipalities and local land trusts. www.ctfarmland.org, Emoore@ctfarmland.org, 860-247-0202

79. DEEP Forestry Division, Private and Municipal Lands Program
David Irvin, Central District Service Forester
DEEP Forestry performs a wide range of public services regarding the State of Connecticut's urban and rural forests. This includes forests on both public and private land. The Private and Municipal Lands component of DEEP Forestry will be out in force at Plant Science Day, as we have found it to be an excellent venue at which to make contact with our constituents, be that public officials, private forestland owners or just people in general interested in trees and in the welfare of the trees and forests in the state. https://portal.ct.gov/deep, david.irvin@ct.gov, 860-462-8961

80. Federated Garden Clubs of Connecticut
Kelle Ruden
The Mission of the Federated Garden Clubs of Connecticut, Inc., is to coordinate, stimulate and encourage higher standards in all aspects of Garden Club work. To protect and conserve our natural resources, preserve our heritage and promote civic beauty. We fulfill our mission in rich and varied ways, offering our 113 member clubs with 6,000 members and our affiliate member organizations opportunities to participate in, and contribute to, the core mission and values of the Federation. www.ctgardenclubs.org, kelle.ruden@ctgardenclubs.org, 203-246-7945

81. Levo International
Isabella Vega
Levo International is a non-profit 501(c)3 organization dedicated to eliminating food insecurity through innovation and partnership. Levo's main focus has been delivering assistance to food insecure neighborhoods in Connecticut and in Haiti. Hydroponics is the growth of plants without soil in a water-based system. Simplified forms of hydroponics are the main mechanisms Levo uses to increase food access. Levo's research program has therefore focused on reducing the inputs required for hydroponic farming to increase its accessibility and impact. With the support of the Connecticut Agricultural Experiment Station, Levo has ongoing research efforts exploring the development and deployment of effective natural fertilizers and evaluating yield differences between hydroponic and soil-based farming. www.levointernational.org, ivega@levointernational.org, 203-981-6363

82. Master Gardeners of UConn Extension
Eric Larson
The UConn Extension Master Gardener Program trains citizens to develop skills in botany, horticulture, and gardening to assist the community in best practices for diagnosing diseases and pests by presenting the clients with scientifically based choices. www.mastergardener.uconn.edu, eric.larson2@uconn.edu, 203-285-4918

83. Sleeping Giant Park Association
Mick Martucci
SGPA is an all-volunteer 501(c)3 non-profit organization, dedicated to protecting and caring for the Sleeping Giant. The Sleeping Giant Park Association, Inc. was founded in 1924 to protect the Sleeping Giant from quarrying, and to establish the iconic ridgelines as a park for the people of Connecticut. SGPA is Connecticut's oldest state park "friends group", and has a tremendous history of conservation and stewardship. The mission of SGPA, in partnership with the State of Connecticut, is to build upon a legacy of conservation and stewardship to expand the park and the opportunities it offers for physical recreation, spiritual renewal, and enjoyment of and learning about the natural world. www.sgpa.org, hiking@sgpa.org, 203-430-7721

84. The American Chestnut Foundation - CT Chapter
Florian Carle
More than a century ago, nearly four billion American chestnut trees were growing in the eastern U.S. They were among the largest, tallest, and fastest-growing trees. The wood was rot-resistant, straight-grained, and suitable for furniture, fencing, and building. The nuts fed billions of wildlife, people and their livestock. It was almost a perfect tree, that is, until a blight fungus accidentally introduced by humans killed it more than a century ago. Since then, The American Chestnut Foundation (TACF) is committed to restoring the American chestnut tree to its native range (200 million acres of eastern woodlands). Unlike other environmental organizations, TACF's mission is not about preventing environmental loss or preserving what we already have. The loss already occurred and TACF is trying to restore an entire ecosystem. Our goal is to create a template for the restoration of other chestnut tree species throughout the world. During Plant Science Day Event, members of the TACF Connecticut Chapter will be there to answer all your chestnut-related questions and show you the various species of chestnut trees in the Lockwood orchard we are using to help restore this great tree to Connecticut and the US. www.tacf.org/ct, CTChapter@tacf.org, 203-821-1021

85. U.S. Department of Agriculture - Farm Service Agency
Karen Murray
The Connecticut division of the Farm Service Agency (FSA) offers farmers a variety of assistance through farm programs, farm loans and ad hoc disaster programs. Our employees work with farmers daily to identify assistance we can provide for their specific operations. We've been serving farmers since 1935 and we're always looking for opportunities to strengthen Connecticut's agricultural community. To learn about what we can do for you, contact your local county office. The New Haven-Middlesex County Farm Service Agency is located at 97 Barnes Road Suite 2 in Wallingford. Phone: (203) 269-6665 Email: karen.murray@usda.gov or teresa.peavey@usda.gov

86. U.S. Department of Agriculture - Forest Service Northern Research Station
Nathan Havill
In a region extending from Maine to Minnesota and from Missouri to Maryland, the USDA Forest Service Northern Research Station's science aims to understand all of the elements of forests and related landscapes. The station manages 22 of the 80 experimental forests that are part of the Forest Service Experimental Forest Network; most of these long-term research sites lie within National Forests. The Forest Service's ability to conduct scientific research in-house, apply research findings on National Forest System lands, and transfer these findings to others for use on all of the nation's forest land distinguishes it as a leading natural resource agency. The Forest Service lab in Hamden is part of the Ecology and Management of Invasive Species Unit of the Northern Research Station. This research unit provides knowledge and methods for protecting and sustaining healthy forests affected by invasive species and other disturbances focusing on three major problems:

- Understanding the biology and ecology of invasive species and their interactions with native species.
- Developing strategies and tactics to control invasive species; and
- Developing integrated strategies for sustaining forest ecosystems that are resilient to invasive species and other disturbances. www.fs.usda.gov/research/nrs, nathan.p.havill@usda.gov, 203-230-4320

87. U.S. Department of Labor, Wage and Hour Division
Heather Callahan
The U.S. Department of Labor, Wage and Hour Division's (WHD) mission is to promote and achieve compliance with labor standards to protect and enhance the welfare of the nation's workforce. WHD enforces federal minimum wage, overtime pay, recordkeeping, and child labor requirements of the Fair Labor Standards Act. WHD also enforces the Migrant and Seasonal Agricultural Worker Protection Act, the Employee Polygraph Protection Act, the Family and Medical Leave Act, wage garnishment provisions of the Consumer Credit Protection Act, and a number of employment standards and worker protections as provided in several immigration-related statutes. Additionally, WHD administers and enforces the prevailing wage requirements of the Davis-Bacon and Related Acts and the Service Contract Act and other statutes applicable to federal contracts for construction and for the provision of goods and services. www.dol.gov/agencies/whd, callahan.heather@dol.gov, 860-240-4911

88. UConn IPM Program
Vickie Wallace
UConn's College of Agriculture, Health and Natural Resources IPM Team works with residents to utilize IPM tactics when dealing with pest issues in plants. The IPM Team covers the green industry and commercial agriculture. ipm.cahnr.uconn.edu, victoria.wallace@uconn.edu, 860-885-2826

89. USDA APHIS PPQ
Sara Carson
APHIS' Plant Protection and Quarantine (PPQ) program safeguards U.S. agriculture and natural resources against the entry, establishment, and spread of economically and environmentally significant pests, and facilitates the safe trade of agricultural products. www.aphis.usda.gov/aphis/ourfocus/planthealth, sara.carson@usda.gov, 203-837-7711

90. USDA Natural Resources Conservation Service
Vivian Felten
Through technical and financial assistance programs, USDA NRCS delivers conservation solutions so agricultural producers can protect natural resources and feed a growing world. https://www.nrcs.usda.gov, vivian.felten@usda.gov, 860-871-4011

91. Wild Ones Connecticut Mountain Laurel Chapter
Lydia Pan

Wild Ones is a national 501(c)(3) organization that promotes environmentally sound landscaping practices to preserve biodiversity through the preservation, restoration, and establishment of native plant communities. Wild Ones awards Seeds for Education grants and certifies native plant butterfly gardens. The Mountain Laurel Chapter is based in New London, CT and sponsored by the Connecticut College Arboretum. We raise awareness about the importance of landscaping with native plants in urban & suburban gardens to support pollinators and other wildlife. Our monthly programs are generally free and open to the public. Our exhibit will have literature about ecological landscaping, lists of native plant alternatives, best native plants for wildlife, instructions on how to propagate native plants from seed and where to obtain seed-grown plants and seeds for species native to our ecoregion. www.mountainlaurel.wildones.org, wild.native.plants@gmail.com, 860-383-3580

92. Northeast Organic Farming Association of CT (CT NOFA)

Kimberly Stoner

CT NOFA Educators of Organics, The Northeast Organic Farming Association of CT's mission is to ensure the growth and viability of organic agriculture, organic food, and organic land care. We envision a healthy, organic Connecticut founded on ecologically, socially, and economically just principles. In addition to our food-based initiatives, we also run the NOFA Organic Land Care program to train the next generation of organic landscapers, land managers, and conservationists. www.ctnofa.org; kim@ctnofa.org, 203-408-6819

*Other plots at the farm provide food for the Connecticut Food Bank.

SPEAKER BIOGRAPHIES

Susan K. Brown, Ph.D.-- Samuel W. Johnson Memorial Lecturer
Susan Brown is the Herman M. Cohn Professor of Agriculture and Life Sciences at Cornell University and a faculty member in the sections of Horticulture and Plant Breeding and Genetics in the School of Integrative Plant Science. Susan leads the Cornell apple breeding program and in addition to her research, she has named eight sweet cherries, one tart cherry and seven apple varieties, with the managed varieties SnapDragon™ and RubyFrost™ the most well-known releases. 'SnapDragon' (NY 1) is the official apple of the NFL's Buffalo Bills team. Among her awards, Susan was a NY State Senate Woman of Distinction in 2014, received the American Pomological Society's Wilder Medal in 2016 for her contributions to Pomology and was named a Fellow of the American Society of Horticultural Sciences in 2019.

Hany Dweck, Ph.D.
Hany Dweck has been a Chemical ecologist and Assistant Agricultural scientist II in the Department of Entomology at the Connecticut Agricultural Station since January 2023. He earned a B.Sc. and M.Sc. at Cairo University, Ph.D. at the Max Planck Institute for Chemical Ecology, and conducted postdoctoral studies in the laboratory of Dr. John Carlson at Yale University. He was born in Giza, Egypt, and has lived in Sweden, Germany, and the United States. He is also a proud husband and father of two boys. His laboratory studies how crop pests find their host plants, communicate, and avoid danger using tools and techniques from various fields, including behavior, electrophysiology, analytical chemistry, molecular biology, and genetics.

Jeremiah R. Foley IV, Ph.D.
Jeremiah R. Foley, IV, PHD joined The Connecticut Agricultural Experiment Station (CAES) Department of Environmental Science and Forestry as an Assistant Agricultural Scientist II in May 2023 in the newly formed Office of Aquatic Invasive Species (OAIS). With a master's and Ph.D. in Entomology from the University of Florida and Virginia Tech, respectively, Jeremiah brought a wealth of knowledge and experience to his role. During his graduate studies, he focused on some of North America's most invasive animal species, including the Formosan subterranean termite and the hemlock woolly adelgid, and worked at the United States Department of Agriculture (USDA) Invasive Plant Research Laboratory (IPRL). His work there centered on a systems-based approach integrating biological control, chemical control, and community restoration to address aquatic ecosystem health and resilience in the face of invasive species. At the CAES, Jeremiah applied his expertise to tackle the complex challenges of aquatic plant invasions, aiming to educate the public, coordinate research efforts, and inform management strategies across Connecticut's water bodies. Working alongside colleagues, he conducted surveys to assess the density and distribution of aquatic invasive species, advocating for integrated approaches to combat aquatic invasive species issues.

Andrea Gloria-Soria, Ph.D.
Andrea Gloria-Soria joined The Connecticut Agricultural Station as an Assistant Agricultural Scientist in January 2018. She earned a B.Sc. at the Universidad Nacional Autónoma de México (UNAM) and a Ph.D. in Molecular and Cellular Biology from the University of Houston, Texas. She was a Gaylord Donnelley Environmental Postdoctoral Fellow at Yale from 2009-2011 with Dr. Leo Buss and Dr. Stephen Dellaporta and continued her postdoctoral work with Dr. Jeffrey Powell at Yale University. Dr. Gloria-Soria has expertise in population genetics, molecular biology, evolutionary genetics, vector biology, and experimental evolution. She studies patterns of genetic diversity in disease vectors to understand their historical and modern distribution and the implications of genetic variation on disease transmission. Her work initially focused on the yellow fever mosquito *Aedes aegypti* and now has expanded to study the northern house mosquito, *Culex pipiens*, the tiger mosquito, *Aedes albopictus*, and the eastern tree hole mosquito, *Aedes triseriatus*.

Joseph Liquori
Joseph Liquori is a Research Technician who was hired in 2023. Joe graduated from the University of Connecticut in December 2020, and spent two summers during his studies working at Lockwood Farm as a summer student for Dr. Abigail Maynard and assisting farm manager Richard Cecarelli. Previous to joining The Connecticut Agricultural Experiment Station, Joe spent two years as a plant propagator for Summer Hill Nursery in Madison, CT. Joe now serves as the greenhouse manager for the Station, as well as a technician for the Department of Plant Pathology and Ecology.

Raquel Rocha, Ph.D.
Raquel Rocha leads a soilborne diseases laboratory, where she studies how plant pathogenic fungi and nematodes respond dynamically to their environment and cause disease. She develops use-inspired basic research focused on the comprehensive and mechanistic understanding of diseases in vegetables and other crops of interest to growers in Connecticut and the northeastern United States. Before The Connecticut Agricultural Experiment Station, Dr. Rocha worked as a Postdoctoral Research Associate at the University of Georgia, where her research focused on the identification of novel control targets in the root-knot nematode *Meloidogyne incognita*. Dr. Rocha received her Ph.D. in Agronomy, specializing in Plant Pathology, from the University of Nebraska-Lincoln. She researched the metabolic pathways necessary for the rice blast fungus *Magnaporthe oryzae* to thrive in host cells. Before moving to the U.S., Dr. Rocha obtained her bachelor's and master's degrees at the Federal University of Ceará - Brazil, where she studied the structural and functional properties of plant proteins and their applicability in agriculture and health.

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History of The Connecticut Agricultural Experiment Station

The Connecticut Agricultural Experiment Station (CAES) is one of a national network of state agricultural experiment stations. Experiment Station scientists collaborate with researchers in other states and the federal government to solve local, regional, and national problems.

The CAES is the first state agricultural experiment station in the United States. It was founded by the efforts of Samuel W. Johnson, a professor of agricultural chemistry at Yale University. Johnson had seen an agricultural experiment station when he did his studies in Germany during the 1850s. He saw how the science of chemistry could be used to aid farmers and campaigned for 20 years until one was established by the Connecticut legislature in 1875. Initially opened as a chemistry laboratory at Wesleyan University in Middletown, the Station was moved to Yale in 1877, where its first bulletin reported on analysis of a fertilizer that had little agricultural value. In 1882, the Experiment Station moved to its present location on Huntington Street (previously named as Suburban Street) in New Haven. Besides Lockwood Farm, its outdoor laboratory in Hamden, the Experiment Station also has a research farm and laboratories in Griswold and Windsor.

Through the years, many important discoveries have been made by researchers at The CAES. For example, vitamin A was discovered as an outgrowth of studies of the chemical composition of foods. The first practical hybrid of corn was developed, and many experiments in increasing the yield of corn were conducted at Lockwood Farm by Donald F. Jones. This discovery led to the doubling of yields of corn crops throughout the nation and led to more abundant and lower cost of food for mankind. Also, at Lockwood Farm, experiments were conducted, which led to the development of organic fungicides, some of which are still in use to combat plant diseases. These fungicides replaced toxic heavy metals previously used to control plant pathogens. The first culture of the West Nile virus in North America was made at the main campus in New Haven.

Research at the Experiment Station covers plants and their pests, such as diseases and insects; the pests of man and animals such as mosquitoes and ticks; growth of the state's forests; methods of enhancing the growth of plants by protecting them from pests and increasing crop yields through cloning of genes; and studies of environmental contamination and ways to reduce application of pesticides or their impact on the environment. Research continues on crops for biodiesel fuel production and for nematode control. Staff at the Station also analyze fresh fruits and vegetables for excess pesticide residues, test fertilizers and animal feeds for compliance with label claims and screen a wide variety of foods as a part of the federal and state's food and product safety monitoring programs.

Some current research includes:

- Release of a lady beetle to control the hemlock woolly adelgid, which can kill hemlocks throughout the state.
- Studies of the pathogen that causes Lyme disease and means of controlling the tick vector.
- Treatments to reduce the toxicity of organic contaminants in soil and water.
- Studies of natural changes in Connecticut's forests and control of exotic plant species.
- Ways to control insect pests of plants using non-chemical means.
- Surveys and studies of the eastern equine encephalitis virus, West Nile virus, and other encephalitis viruses in mosquitoes.
- Enhancing growth of crops through the use of compost as a substitute for fertilizer.
- Finding new crops for Connecticut farmers and developing the best growing practices for existing crops in Connecticut.
- Studies of invasive aquatic plants and methods of control.
- Deciphering the cause of Sudden Vegetation Dieback in Connecticut salt marshes.
- Surveys for the emerald ash borer and the release of parasitoids to help control this invasive insect.
- Studies of native pollinators and floral resources for wild bees.

The experiments at Lockwood Farm are only a portion of these conducted by Station scientists. Scientists also perform experiments in New Haven, Griswold, and Windsor and carry out other experiments in state forests and on private lands.

CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, founded in 1875, is the first state agricultural experiment station in America. It is chartered by the General Assembly to make scientific inquiries and experiments regarding plants and their pests, insects, soil, and water, and to perform analyses for State agencies.

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THE EXPERIMENT STATION'S WEB PAGE: http://portal.ct.gov/caes
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Revised: Thursday, July 11, 2024, 1:01:37 PM
