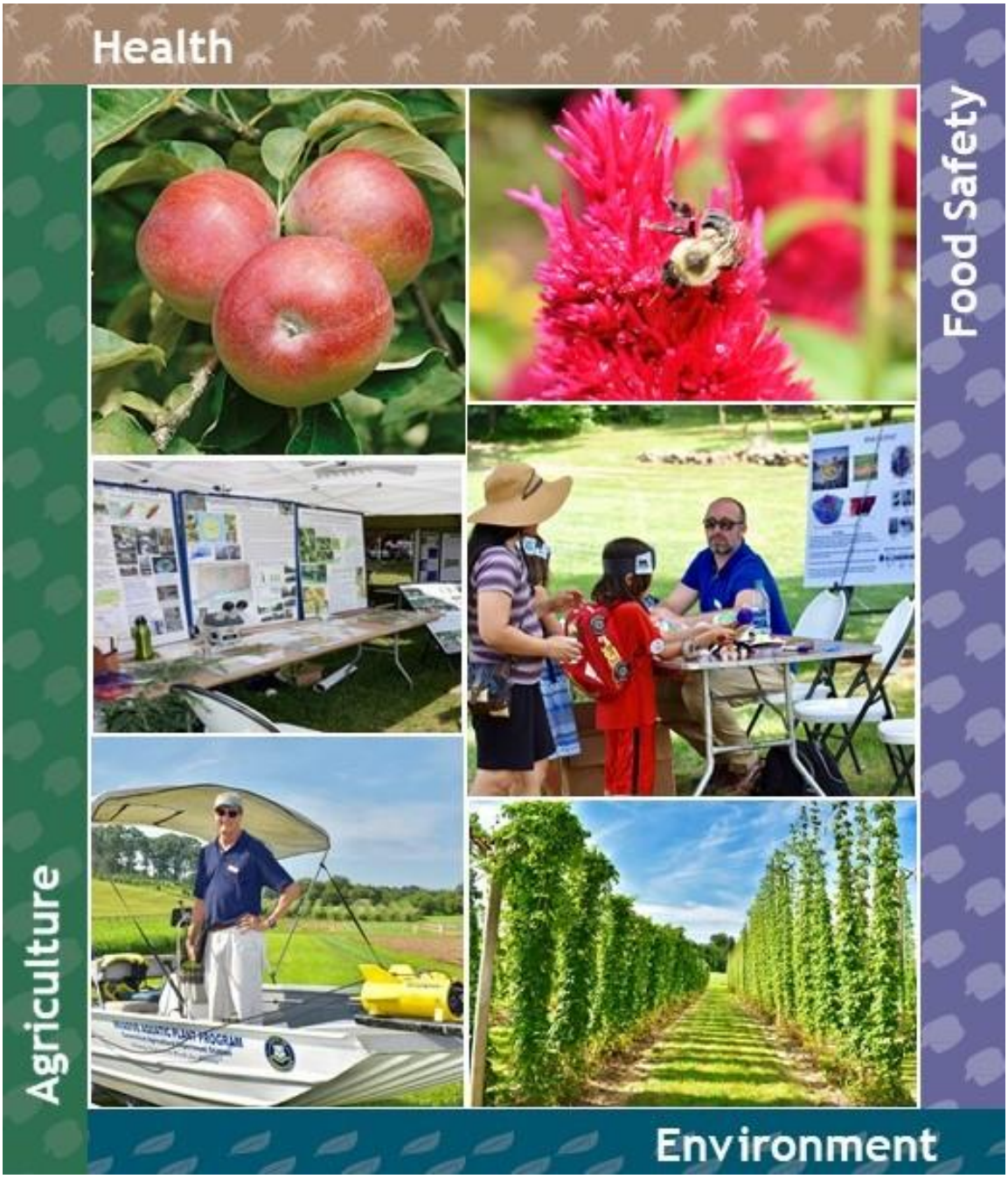
The Connecticut Agricultural Experiment Station
111th Plant Science Day

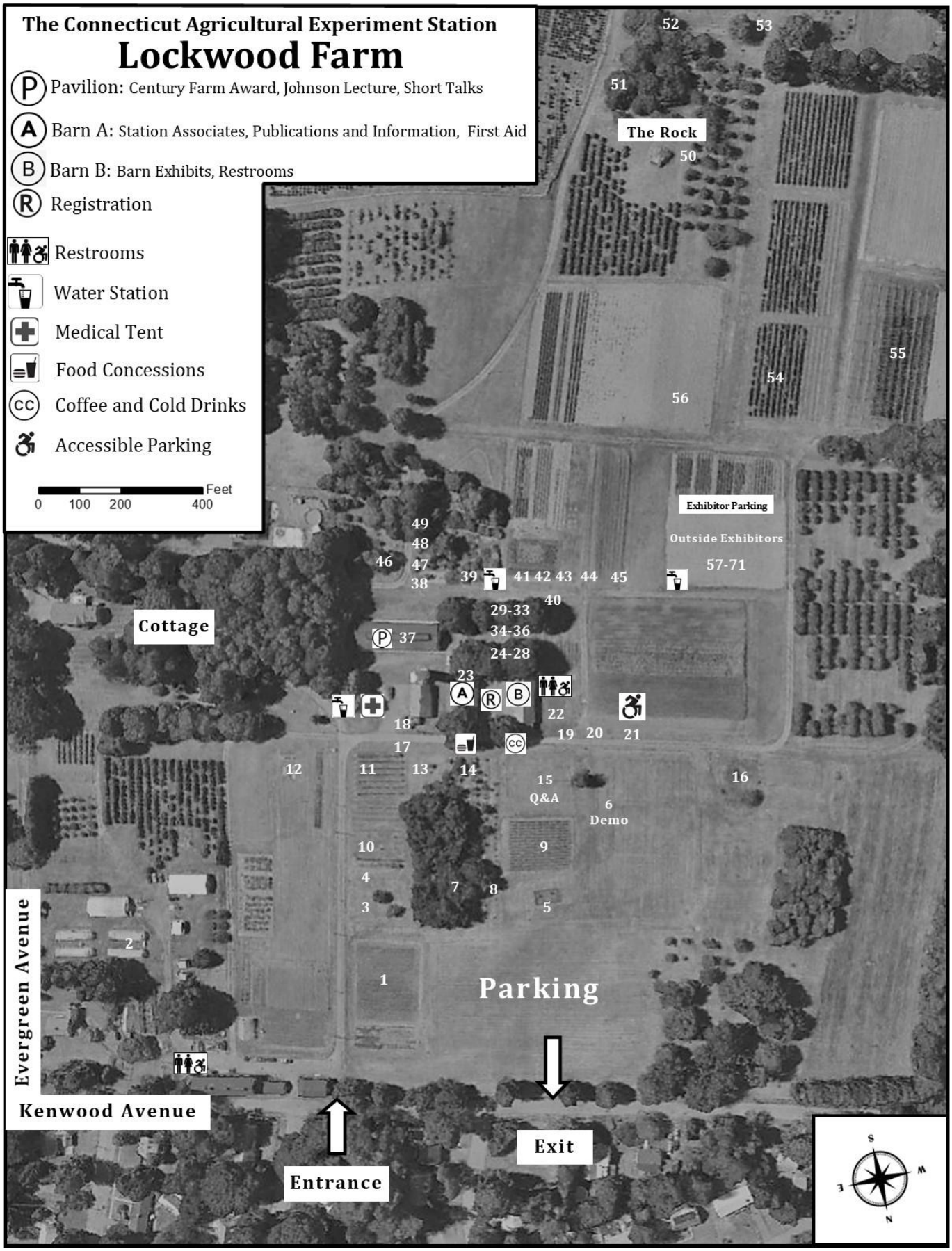
Lockwood Farm
890 Evergreen Avenue, Hamden, CT 06518
Wednesday, August 4, 2021



CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875


The Connecticut Agricultural Experiment Station
Lockwood Farm
Pavilion: Century Farm Award, Johnson Lecture, Short Talks
Barn A: Station Associates, Publications and Information, First Aid
Barn B: Barn Exhibits, Restrooms
Registration
Restrooms
Water Station
Medical Tent
Food Concessions
Coffee and Cold Drinks
Accessible Parking
Feet
0 100 200 400
The Rock
Exhibitor Parking
Outside Exhibitors
57-71
Cottage
Q&A
Demo
Parking
Evergreen Avenue
Kenwood Avenue
Entrance
Exit
S
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N

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 Ms. 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 2021 Planning Committee

Mr. Michael Ammirata
Ms. Terri Arsenault
Mr. Joseph Barsky
Mr. Gregory Bugbee
Ms. Vickie Bomba-Lewandoski
Ms. Sandra Carney
Mr. Michael Cavadini
Mr. Richard Cecarelli
Dr. Brian Eitzer
Dr. Wade Elmer
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Dr. Andrea Gloria-Soria
Ms. Regan Huntley
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Dr. Neil Schultes
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Dr. Blaire Steven
Mr. Peter Thiel
Mr. Eric Wagner
Dr. Jeffrey Ward
Dr. Jason White
Dr. Quan Zeng
Dr. Nubia Zuverza-Mena

Program booklet created, compiled, and edited by
Ms. Vickie Bomba-Lewandoski and assisted by Ms. Kelly Fairbrother and Ms. 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.

Revised: July 2018

2021 OUTSTANDING YOUNG FARMER AWARD

The Outstanding Young Farmer Award is given annually by the Connecticut Agricultural Information Council (CAIC), a coalition of state farming groups, as part of the festivities surrounding Connecticut Agriculture Day held at the Connecticut State Capitol.

Suzie Flores, Stonington Kelp Co.
Stonington, CT

The 2021 Connecticut Outstanding Young Farmer award was presented to Suzie Flores, a former market development executive who owns and operates Stonington Kelp Co. with her husband Jay and three children. The vision for the farm began five years ago in 2016 and the following year was up and running through a partnership with GreenWave, a non-profit dedicated to supporting the next generation of ocean farmers. Today, the farm is one of the largest commercial seaweed farms in the state selling food grade sugar kelp to local restaurants and shops.

Sugar kelp is the only variety of seaweed that can be legally grown in Connecticut and has a slightly sweeter flavor. While the nutritional benefits of sugar kelp are well known, the positive role this native sea vegetable can have on the environment is what really drives Flores. Her farming methods highlight the importance of regenerative and sustainable farming for the ocean. Sugar kelp absorbs carbon and nitrogen from the water while it grows, directly addressing climate change and mitigating the impacts of ocean acidification.

2021 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.

March Farm
Bethlehem, CT

Proclamation from Governor Ned Lamont:

March Farm is a fourth-generation family farm located in Bethlehem among the beautiful rolling hills of Litchfield County. Purchased in 1915 by Thomas and Rose Marchukaitis, the farm consisted of 114 acres and supported 15 cows and 2 horses. In 1937, Thomas and Rose's son Matthew and his wife Anastasia bought the land and stock. At that time, a diversified farm was started and was operated as such for many years. The first tractor was purchased in 1939.

During the 1940s, poultry and dairy barns were added to accommodate 50 cows and approximately 600 chickens. During the 1950s, 14 acres of adjoining land was purchased and apple orchards were planted. Throughout the next 3 decades, stock and fruit production were increased until there were 100 dairy cattle, 40 acres of fruit trees, 5 acres of blueberries, and many acres of sweet corn, cabbage, potatoes, squash, pumpkins, other vegetables, and hay.

On July 1, 1977, the farm was purchased from Matt and Anastasia by their son Thomas and his wife Susan. In 1988, some changes were made. Thomas decided to sell the cows and concentrate more on producing vegetables and fruit. A commercial kitchen was also installed in order to accommodate a bakery business to supplement produce and other items sold at the farm store.

The next year, a greenhouse was added to produce quality tomatoes. Since that time, 11 more greenhouses have been added to produce a variety of tomato types, cucumbers, squash, lettuce, and salad greens in addition to many outdoor vegetable fields. Orchard sizes have been increased, as has the production of sweet corn. During the 1990s, “Pick-Your-Own” became increasingly popular and has been encouraged for berries, fruit, and pumpkins.

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' KORNER (Plot 20)

Come to the Kids' Korner 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 28) 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 / 3.25 TOTAL CREDIT HOURS.**

SOCIAL MEDIA LINKS

Keep current with The Connecticut Agricultural Experiment Station by using our SOCIAL MEDIA and Email alert resources.

CAES is encouraging our constituents to share their photos about 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)

Twitter (www.twitter.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 just 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

111th 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 – Ms. Vickie M. Bomba-Lewandoski, Information Officer

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

10:15 a.m. - 10:45 a.m. **PAVILION**
Dr. Robert E. Marra, Associate Agricultural Scientist, Department of Plant Pathology and Ecology
Beech Leaf Disease: Emergence and Spread in Connecticut and New England
The American beech, *Fagus grandifolia,* is an important hardwood of eastern North American forests. As a foundational tree species, *F. grandifolia* plays an important role in forest ecosystems, providing shelter, nesting sites, and food to a variety of vertebrates, from birds to black bears. The dense foliage of healthy beech trees modulates light levels in the understory and contributes, through leaf litter, to nutrient cycling on the forest floor. Having endured the beech bark disease complex for over 100 years, American beech is now under attack by **beech leaf disease (BLD),** caused by a newly identified (2020) foliar nematode, *Litylenchus crenatae* subspecies *mccannii*. BLD is easily identified by the dark interveinal banding of leaves, appearing immediately upon bud break, the result of the causal nematode overwintering in buds. First discovered in Ohio in 2012, the disease reached Fairfield County, Connecticut in 2019. In 2020, our distribution survey revealed BLD in seven of CT's eight counties, fairly low levels of severity. This year, the disease has reappeared at unexpectedly high levels of severity, and in new areas. The most severe outbreaks are in Connecticut's lower four counties, with isolated and moderate outbreaks in lower Litchfield, Tolland, and Windham Counties. In many of these beech stands, both understory and overstory beeches are affected, characterized by canopy thinning, twig and branch dieback, and in some cases sapling mortality. The means and timing of the nematode's dispersal, within and among trees, and from one site to another, are the subjects of current investigation. In my lab, we are developing genetic fingerprinting markers in order to identify pathways of the nematode's spread. Other researchers are investigating the possible role of vectors, including insects, birds, and mammals. Research conducted in Ohio on possible control options has not been all that promising, though there are some reports of efficacy reported by commercial tree care firms. More work is needed in this area; however, it is important to recognize that while these treatments may have utility in the urban and suburban landscape, it is unlikely that they will be appropriate for large forested lands.

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.)
Mr. Gregory J. Bugbee, Associate Agricultural Scientist, Department of Environmental Sciences
Assisted by: Ms. Summer Stebbins, Agricultural Research Technician, Department of Environmental Sciences
Container and Raised Bed Gardening: Big Yields From Small Places
Do you want to grow fresh vegetables and flowers even though you have little or no suitable land? If so, container or raised bed gardening could be your answer. Container gardening is perfect for those with a sunny porch, deck, or patio while raised beds are great for those with small plots of land with poor soil and want to limit the bending needed to tend crops. Both types of gardening can produce greater crop yields per square foot than conventional gardens because soil conditions and plant care can be maximized. The key is choosing a good location, selecting the right containers, building raised beds correctly, making the perfect soil, and choosing the best crops. Understanding how plant care during the growing season may differ from a typical garden plot is also important. This technical demonstration will cover these topics as well as utilizing companion crops, the safety of treated wood in raised beds, and optimizing plant growth with soil tests.

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.)

Dr. Scott C. Williams, Agricultural Scientist, Department of Forestry and Horticulture
Assisted by: Mr. Michael R. Short, Agricultural Research Technician II, Department of Forestry and Horticulture

Deer and Wildlife Control in Your Garden

There is nothing more frustrating for gardeners than going to pick that tomato you have been watching ripen for a week only to find it discarded on the ground with three bites taken out of it by a chipmunk. Or going to cut a bouquet of your flowers to enjoy in the house only to find them not there anymore because they were consumed and trampled by the local deer family. Or finding that over the winter, many of your shrubs were girdled under the snow by voles. The majority of Connecticut is forested habitat and we humans not only live among our abundant wildlife species, but also plant food that is highly desirable to them and then get frustrated when they come eat it! This demonstration talk will discuss strategies to begin to protect your garden from damage by our local wild herbivores. We will discuss topics such as identifying the culprit using clues they leave behind, the use of repellents, fencing, and planting placement within your gardens. We will answer your questions and try to get you to understand the habits of the various animals causing the damage to get you inside the heads of these critters such that you can be more effective in taking steps to deter them by knowing what they like and what they don't like.

10:45 a.m. - 11:05 a.m. **PAVILION**
OUTSTANDING YOUNG FARMER AWARD
Suzie Flores, Stonington Kelp Co., Stonington, CT

CENTURY FARM AWARD
March Farm, Bethlehem, CT

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

11:15 a.m. – 12:00 noon **PAVILION**
THE SAMUEL W. JOHNSON MEMORIAL LECTURE
Mr. Brent Peterkin, Executive Director
Gather New Haven, New Haven, CT
Urban Ecosystems and Cultivating Communities

1:15 p.m.-1:45 p.m. **PAVILION**
Dr. Walter Krol, Associate Agricultural Scientist, and Ms. Terri Arsenault, Agricultural Research Technician II, Department of Analytical Chemistry

Industrial Hemp: An Emerging Crop in Connecticut

In December 2018, the farm bill was passed and signed into law. This bill removed hemp, defined as *Cannabis sativa* with less than 0.3% delta-9 tetrahydrocannabinol (THC), from the schedule I controlled substances list, which paved the way for its legal cultivation. The only reliable method for determining the legal status of Cannabis is through laboratory testing. In 2020, there were 140 hemp growers licensed in Connecticut with 156 acres planted. CAES started field trials in 2019 to examine hemp varieties for THC and CBD, as well as variability in those measures that may arise from variability in growing conditions or seed genetics. Results from trials have shown that at least some hemp varieties will exceed the legal limit if allowed to reach full maturity. Based on this data, the upper end of CBD production is around 8%, and most crops should be harvested prior to the autumnal equinox. Regardless of the status of recreational marijuana in CT and elsewhere, this testing will be necessary to ensure that CBD products don't contain high levels of psychoactive THC.

1:45 p.m.-2:15 p.m. **PAVILION**
Dr. Kirby C. Stafford III, Chief Scientist, State Entomologist, Department of Entomology

Plant Science Day Celebration: A History

Last year was the 110th anniversary of our summer field day held at our research farm. While 2020 was a virtual field day dictated by pandemic restrictions, we have welcomed the public to hear presentations, ask our scientists and staff questions, and visit field plots since The Connecticut Agricultural Experiment

Station held its first Field Day on 10 August 1910 at its leased Centerville Farm in Hamden. The first 19.6 acres of the Mt. Carmel Farm, now called Lockwood Farm, was purchased by the Board of Control late in 1910 and the first Mt. Carmel Field Day was held in 1913. There was no field day during the war years of 1942-1944, when 16 staff were serving in the Armed Forces. Today the farm encompasses 75 acres with a new pavilion constructed in 2015. Newer innovations include wheel-chair accessibility, a bird and butterfly garden, activities for children, and the participation of other agricultural and environmental groups. This year, Plant Science Day continues to present the work of the Experiment Station staff in service to the citizens of Connecticut.

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.)
Mr. Gregory J. Bugbee, Associate Agricultural Scientist, Department of Environmental Sciences
Assisted by: Ms. Summer Stebbins, Agricultural Research Technician, Department of Environmental Sciences
Container and Raised Bed Gardening: Big Yields From Small Places
Do you want to grow fresh vegetables and flowers even though you have little or no suitable land? If so, container or raised bed gardening could be your answer. Container gardening is perfect for those with a sunny porch, deck, or patio while raised beds are great for those with small plots of land with poor soil and want to limit the bending needed to tend crops. Both types of gardening can produce greater crop yields per square foot than conventional gardens because soil conditions and plant care can be maximized. The key is choosing a good location, selecting the right containers, building raised beds correctly, making the perfect soil, and choosing the best crops. Understanding how plant care during the growing season may differ from a typical garden plot is also important. This technical demonstration will cover these topics as well as utilizing companion crops, the safety of treated wood in raised beds, and optimizing plant growth with soil tests.

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.)
Dr. Scott C. Williams, Agricultural Scientist, Department of Forestry and Horticulture
Assisted by: Mr. Michael R. Short, Agricultural Research Technician II, Department of Forestry and Horticulture
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There is nothing more frustrating for gardeners than going to pick that tomato you have been watching ripen for a week only to find it discarded on the ground with three bites taken out of it by a chipmunk. Or going to cut a bouquet of your flowers to enjoy in the house only to find them not there anymore because they were consumed and trampled by the local deer family. Or finding that over the winter, many of your shrubs were girdled under the snow by voles. The majority of Connecticut is forested habitat and we humans not only live among our abundant wildlife species, but also plant food that is highly desirable to them and then get frustrated when they come eat it! This demonstration talk will discuss strategies to begin to protect your garden from damage by our local wild herbivores. We will discuss topics such as identifying the culprit using clues they leave behind, the use of repellents, fencing, and planting placement within your gardens. We will answer your questions and try to get you to understand the habits of the various animals causing the damage to get you inside the heads of these critters such that you can be more effective in taking steps to deter them by knowing what they like and what they don't like.

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).

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)**
Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology
A one-hour guided tour of selected "off the beaten path" field plots.

TOUR OF NATIVE WOODY SHRUBS (PLOT 38)
1:00 p.m.-1:30 p.m.

1:00 p.m. - 1:30 p.m. **MEET AT THE WOOD ARBOR OF THE NATIVE WOODY SHRUBS (Plot 38)**
Dr. Jeffrey S. Ward, Station Forester and Head, Department of Forestry and Horticulture
A ½ hour guided tour of our Native Shrub planting. Learn about using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

BARN EXHIBITS (BARN B)

Food and Feed Safety Investigations and Research at CAES
Department: Analytical Chemistry
Investigators: Dr. Brian Eitzer, Dr. Walter Krol, Mr. Craig Musante, and Ms. Terri Arsenault
Abstract: The Analytical Chemistry Department at CAES has a long history of conducting analyses on behalf of regulatory agencies that enforce laws regarding contamination and label requirements of food and animal feed. Current programs include the annual market basket survey for pesticides in produce, toxin and heavy metals surveillance exercises as part of the **F**ood **E**mergency **R**esponse **N**etwork, analysis of animal feeds for macronutrients and aflatoxins, and analysis of THC and CBD in hemp and other products. Highlights of some of the recent results from these studies will be presented.

Healthy Forests, Healthy People
Department: Forestry and Horticulture
Investigators: Dr. Scott C. Williams and Dr. Megan A. Linske
Abstract: We have been researching various aspects of tick and tick-borne pathogen ecology throughout Connecticut for almost 15 years in all different kinds of habitats. We have worked in mature forested habitats, in forests infested with invasive plant species, in habitats with too many deer, and in residential backyards. When we step back and look at the results of our research, a common theme comes to light. Tick populations seem to be more abundant and more highly infected with the various disease-causing pathogens in forested habitats in poor health and fewer ticks and infection in healthy, diverse habitats. With this information, residents can learn how to make their backyard habitats diverse and beneficial for a wide variety of wildlife species that dilute both tick abundances and infections which then has the potential to reduce the risk of pathogen transmission to people and pets.

Palmer Amaranth Biotype in Connecticut is Resistant to Multiple Herbicides
Department: Valley Laboratory
Investigator: Dr. Jatinder S. Aulakh
Abstract: Palmer amaranth is the newest pigweed species documented in Connecticut in 2019. The response of Connecticut Palmer amaranth to selected POST herbicides was evaluated under greenhouse conditions at the Windsor Valley Laboratory in 2020. Results showed that the Connecticut Palmer amaranth (CT-Res) biotype required 10-times (4,204 g ae ha^{-1}) higher glyphosate for 90% control (ED90), when compared with the glyphosate-susceptible biotype from Kansas (KS-Sus). The CT-Res biotype was also highly resistant to ALS-inhibitor herbicides; only 18% control was achieved with 2,196 g ai ha^{-1} imazaquin, which was 16 times the labeled rate for control of 15-cm tall Palmer amaranth. Furthermore, the CT-Res biotype was cross-resistant to other ALS-inhibitor herbicides, including chlorimuron-ethyl (13.1 g ai ha^{-1}), halosulfuron-methyl (70 g ai ha^{-1}), and sulfometuron-methyl (392 g ai ha^{-1}). In another experiment, the CT-Res Palmer amaranth was controlled 75–100% with postemergence applications of 2,4-D (386 g ae ha^{-1}), carfentrazone-ethyl (34 g ai ha^{-1}), clopyralid (280 g ae ha^{-1}), dicamba (280 g ae ha^{-1}), glufosinate (595 g ai ha^{-1}), lactofen (220 g ai ha^{-1}), oxyfluorfen (1,121g ai ha^{-1}), and mesotrione (105 g ai ha^{-1}) herbicides. Future research will focus on determining the mechanisms of resistance in CT-Res biotype to ALS-inhibitors and glyphosate herbicides.

How Mosquito Feeding Behavior Impacts Disease Transmission
Department: Environmental Sciences
Investigators: Dr. Douglas Brackney and Dr. Philip Armstrong
Abstract: Mosquitoes transmit a number of viral pathogens to humans, such as dengue virus and Zika virus. Laboratory studies have demonstrated that it normally takes 10-14 days for a mosquito to become infectious (the time from when they acquire the virus to when they can transmit the virus); however, these studies did not account for mosquito feeding behavior, specifically the fact that mosquitoes feed every 3-4 days in nature. Because acquiring a blood meal causes large physiological changes within the mosquito, we asked if providing an extra blood meal could impact how quickly mosquitoes become infectious. We found that when mosquitoes were offered a more natural feeding regimen they were able to transmit viruses much quicker than previously thought by allowing the virus to get from the initial site of infection, the gut, to the salivary glands much more easily. Statistical models demonstrate that this new finding could significantly impact the rate of transmission during an epidemic helping explain the explosiveness of the recent Zika virus outbreak.

Maggots in Murder and Medicine
Department: Entomology
Investigators: Dr. Kirby C. Stafford III and Dr. Gale E. Ridge
Abstract: The larvae (maggots) of certain flies have long played an important role in estimating the time and even cause of death. Medical maggots have been successfully used to treat wounds and treatment-resistant infections. Rodent, rabbit, and human bot flies can infest humans. We highlight three Connecticut examples of the role flies can play in certain crime scene investigations and in human health.

Soil Protists and Plant Health
Department: Plant Pathology and Ecology
Investigators: Dr. Lindsay R. Triplett, Dr. Stephen Taerum, and Dr. Ravi Patel
Abstract: Just like humans, plants have lots of microorganisms living on them that help keep them healthy. The plant microbiome includes bacteria, fungi, microscopic insects and worms, and a variety of other microscopic organisms known as protists. Protists eat a lot of bacteria, and some of them can help plants grow by recycling nutrients or suppressing diseases. CAES researchers are working to identify the protists that live on crops, and to find out which ones do important jobs for plants. Visit this display to learn about the protist-hunting techniques we are using, and to meet some of the protists we have found at Lockwood Farm!

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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Publications; The Connecticut Agricultural Experiment Station; P.O. Box 1106; New Haven, CT 06504-1106, phone 203-974-8447, fax 203-974-8502, e-mail Vickie.Bomba-Lewandoski@ct.gov, or on the web at https://portal.ct.gov/CAES/ABOUT-CAES/Speakers/Available-Speakers

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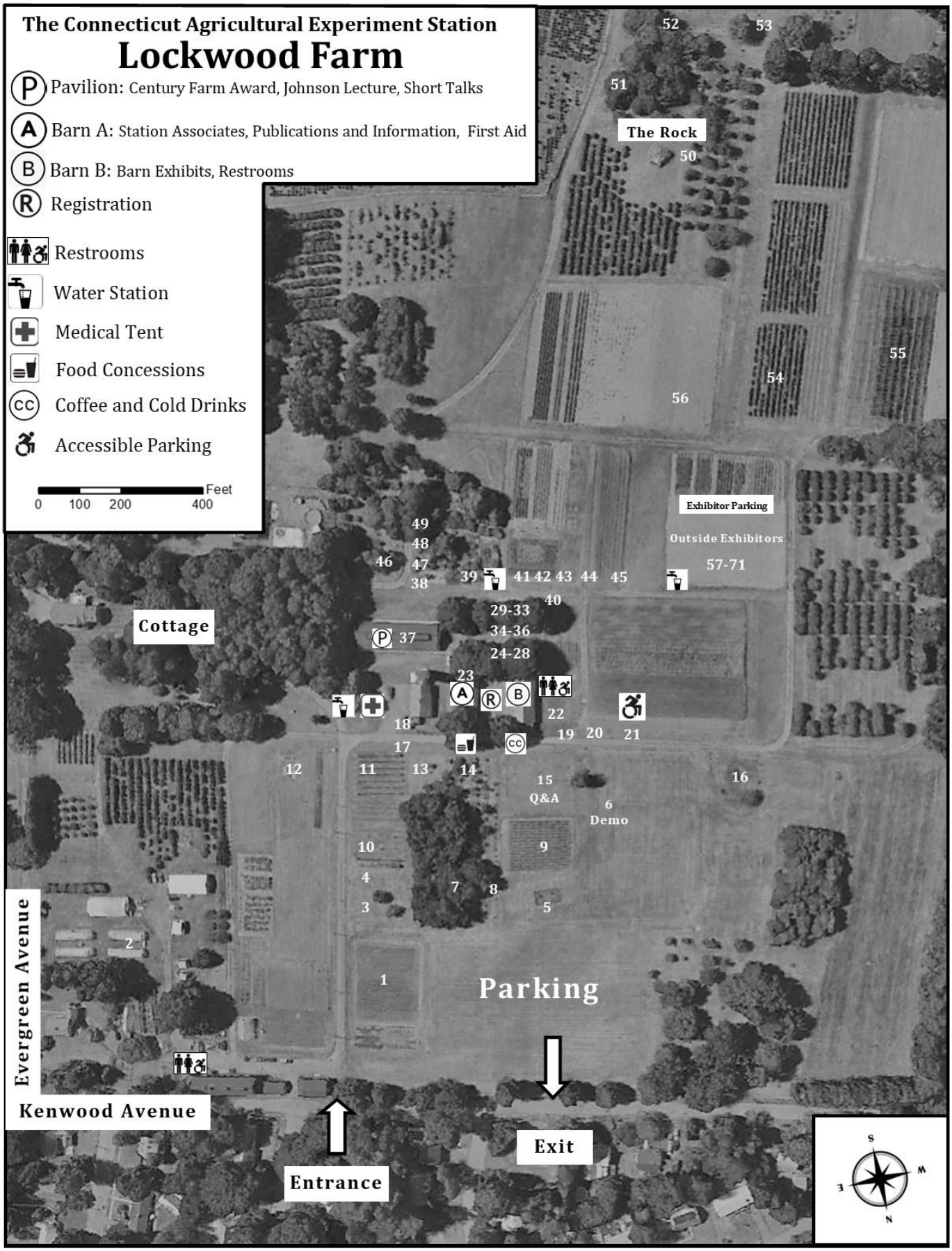
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875


The Connecticut Agricultural Experiment Station
Lockwood Farm
Pavilion: Century Farm Award, Johnson Lecture, Short Talks
Barn A: Station Associates, Publications and Information, First Aid
Barn B: Barn Exhibits, Restrooms
Registration
Restrooms
Water Station
Medical Tent
Food Concessions
Coffee and Cold Drinks
Accessible Parking
Feet
0 100 200 400
The Rock
Exhibitor Parking
Outside Exhibitors
57-71
Cottage
Q&A
Demo
Parking
Evergreen Avenue
Kenwood Avenue
Entrance
Exit
S
W
E
N

FIELD PLOT LISTING

Outside Exhibitors (Plots 17, 18, 19, 23, 57-71) 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 Mr. Richard Cecarelli and his Research Technician Mr. Rollin Hannan as well as seasonal resource assistants Ms. Sophia Coppola, Mr. Michael Piercey Jr., and Mr. Harry Tokarz. Other plots here at the farm provide food for the Connecticut Food Bank.

1. Pollinator Visitation Among Cultivated Varieties of Zinnias
2. Propagation of Figs
3. Commercial Chestnut Cultivars
4. Commercial Chestnut Seedlings
5. Remote Access Weather Station
6. Technical Demonstration Tent
7. Control of Blight on American Chestnuts
8. New Hybrid Chestnut Orchard
9. Sulfur Nanoparticles Suppress Fusarium Wilt of Tomato
10. Table Grape Demonstration Plot
11. Chardonnay Wine Grape Demonstration Plot
12. Growth and Control of Non-Native Bamboos (*Phyllostachys* spp.)
13. Seedlings of Old Surviving American Chestnuts
14. Wild Chestnuts From Turkey
15. Questions and Answers Tent
16. Composting Leaves Using the Static Pile Method
17. Hamden Police Department
18. Crown Castle Cellular Tower
19. The Big Dipper
20. Kids' Corner
21. Self-Guided Activity for All Children, Including Girl Scouts
22. Farm Equipment Used at Lockwood Farm
23. Experiment Station Associates
24. Phosphorous Trapped by Modified Biochar and Recycled as Fertilizer Using Arbuscular Mycorrhizal Fungi
25. The Ministry of Molecular Magic
26. Microbiome on Plants and Its Role in Plant Disease Management
27. POP-Produce Overwintering Program
28. A World of Viruses
29. Chestnut Research
30. Potential of Nanomaterials as Tree Care Agents - Chestnuts as a Case Study
31. Role of Foliar Biointerface Properties and Nanomaterial Chemistry in Controlling Cu Transfer into Wild Type and Mutant *Arabidopsis thaliana* Leaf Tissue
32. Response of Bare-Root Christmas Tree Transplants to Fertilizer at Planting
33. *Phytophthora abietivora*, a New Species Isolated from Diseased Christmas Trees in Connecticut
34. Measuring Human Exposure to Per- and Polyfluoroalkyl Substances (PFAS)
35. 2021: Year of the Southern Pine Beetle?
36. Duration of Protection Provided by Different Fungicides in Boxwood Against Blight Disease
37. The Pavilion at Lockwood Farm
38. Native Woody Shrubs
39. Bird & Butterfly Garden
40. The Public Health and Entomology Tent
    a. Statewide Monitoring Program for Mosquito-borne Viral Diseases in Connecticut
    b. The Blacklegged Tick (Deer Tick) *Ixodes scapularis* and Lone Star Tick, *Amblyomma americanum*
    c. An Integrated Tick Management Project for the Control of the Blacklegged Tick, *Ixodes scapularis*

d. Tracking Ticks and Tick-associated Diseases in Connecticut

41. Ecology and Management of Grapevine Viruses in Connecticut
42. How Do Plant Pathogens Enter Plants?
43. Growing Cannabis in Connecticut - Crop Production and Pest Management
44. Invasive Aquatic Plant Program
45. Hemp Demonstration Plot
46. Chestnut Species and Hybrids
47. Healthy Plants—Healthy Business: Support of The Green Industry by Inspection
48. The Cooperative Agricultural Pest Survey (CAPS) Program and Plant Protection Act Surveys
49. Biological Control of Hemlock Woolly Adelgid
50. The Rock
51. Asian Chestnut Gall Wasp on Chestnut
52. Beach Plum Trials
53. Pawpaw Trials
54. Hybrid and Vinifera Grape Cultivars Plot
55. Hops – Variety Evaluation and Integrated Pest Management
56. Use of Nanoparticle Fertilizers on Plant Disease
57. Connecticut Farm Bureau Association
58. Connecticut Department of Agriculture
59. US Dept. of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ)
60. United States Department of Agriculture - Farm Service Agency (USDA-FSA)
61. The Federated Garden Clubs of Connecticut, Inc.
62. Wild Ones – Mountain Laurel Chapter
63. Levo International, Inc.
64. The Connecticut Tree Protective Association
65. Sleeping Giant Park Association
66. US Department of Agriculture Natural Resources Conservation Service (USDA–NRCS)
67. US Department of Agriculture Natural Resources Conservation Service SoilSHOP (USDA-NRCS SoilSHOP)
68. Connecticut Farmland Trust
69. Connecticut Professional Timber
70. Southwest Conservation District
71. UConn Extension Master Gardener Program

FIELD PLOT ABSTRACTS

1. **Pollinator Visitation Among Cultivated Varieties of Zinnias**
   Dr. Kimberly A. Stoner *Assisted by* Ms. Morgan F. Lowry, Ms. Tracy Zarrillo, Mr. Benjamin Gluck, Mr. James Durrell, and Ms. Annie Bolduc
   Flowering plants evolved in nature to attract pollinators, but plant breeders select and breed cultivated varieties of plants to look pretty and for novelty, which may change their attractiveness to pollinating insects. We are examining 16 cultivated varieties of Zinnias to see to what extent they are visited by pollinators. Our team is part of a large project looking at different popular annual and perennial ornamental plants. Zinnias are among the most popular annuals, and there is great variation among the varieties in pollinator visitation. Zinnias are native to Mexico and Central America, but were brought to Europe in the late 1700s. Plant breeders in Europe and the US have been finding new genetic variations in the three cultivated species and two inter-species hybrids of Zinnias for 200 years. In previous years, 'Lilliput Yellow' had the greatest number of insect visitors to the flowers and was especially attractive to bumble bees.

2. **Propagation of Figs**
   Dr. Charles R. Vossbrinck
   Figs are probably the oldest propagated fruit in the world. Cuttings may have been taken as long as ten thousand years ago. Because figs are difficult to transport, growing figs in Connecticut may become an agriculturally important crop in the future. Figs are not ripe until they are soft, and they do not ripen after they are picked. In addition, they only last for about 2 or 3 days after they are picked. As a result, purchasing fresh figs in local grocery stores can be disappointing. Growing figs locally may be our only recourse in order to enjoy this fresh delicious fruit. This year we demonstrate simple methods for propagating figs from "live" cuttings.

3. **Commercial Chestnut Cultivars**
   Dr. Sandra Anagnostakis
   These trees are commercial cultivars of orchard chestnut trees. The largest trees are 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 cultivar CAES hybrids, planted last year. We are evaluating the potential of these commercial chestnut cultivars for nut production here in Connecticut.

4. **Commercial Chestnut Seedlings**
   Dr. Sandra Anagnostakis
   These seedling trees are open pollinated (mostly Chinese) Dunstan chestnuts. They are not a cultivar (clones from a single tree), but a variety (a type) and are widely available for sale in garden centers. We will compare their growth and nut production with the orchard cultivars in plot #7.

5. **Remote Access Weather Station**
   Remote-access weather stations are deployed at the three Connecticut Agricultural Experiment Station experimental farms located in Hamden CT, Windsor CT, 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.

6. **Technical Demonstration Tent**
   See program page 11 for a schedule of Technical Demonstrations.

7. **Control of Blight on American Chestnuts**
   Dr. Sandra Anagnostakis
   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.

8. **New Hybrid Chestnut Orchard**
   Dr. Sandra Anagnostakis
   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 will be 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.

9. **Sulfur Nanoparticles Suppress Fusarium Wilt of Tomato**
   Dr. Yi Wang, Dr. Jason C. White, and Dr. Wade Elmer
   An increasing number of studies have shown that engineered nanoparticles (ENP) offer a unique potential to deliver agrochemicals, manage plant pathogens, and increase food productivity; all with much higher efficiency compared with their conventional bulk counterparts. However, metal based ENPs may accumulate in the soil and contaminate the environment. Thus, the use of nanoscale sulfur is promising and has attracted increased interest as a multi-functional sustainable agricultural amendment to improve plant growth, productivity, and control disease. In this study, pristine and surface coated sulfur nanoparticles (nS and cS, respectively) were amended in soil that was planted with tomato (*Solanum lycopersicum*) seedlings and infested with *Fusarium oxysporum* f. sp. *lycopersici* under greenhouse conditions. Bulk sulfur (bS), ionic sulfate (iS), and healthy controls treated were also included. Measured endpoints included agronomic parameters, disease severity/prevalence/suppression, and a range of more mechanistic biochemical and molecular endpoints. Results from this study will provide significant mechanistic insight into non-metal nanomaterial-based suppression of plant disease and be used to further optimize this sustainable approach in nano-enabled agricultural systems.

10. **Table Grape Demonstration Plot**
    Drs. Washington da Silva and Gale E. Ridge
    Wine grapes and wineries are a relatively new industry to 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 maintaining 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.

11. **Chardonnay Wine Grape Demonstration Plot**
    Drs. Washington da Silva and Gale E. Ridge
    Wine grapes and wineries are a relatively new industry to 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 maintaining 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 relation between the onset of powdery mildew and climate in order to attune disease-risk models to our local weather conditions.

12. **Growth and Control of Non-Native Bamboos (*Phyllostachys* spp.)**
    Drs. Jeffrey S. Ward and Jatinder Aulakh *Assisted by* Mr. Joseph P. Barsky and Mr. Nicholas Tait
    Running bamboos (*Phyllostachys* spp.) are 15-30 foot tall perennials with canes ranging in color from golden yellow to green to almost black. Properly planted with deep root barriers they can form a gracefully elegant garden focal point or living hedge that is resistant to deer browse. However, without proper root barriers, they can become a nuisance to neighboring properties and form impenetrable thickets in natural areas. We began an experiment in 2012 on our three experimental farms to examine the rate of spread and effectiveness of control options for selected Phyllostachys cultivars in Connecticut.

13. **Seedlings of Old Surviving American Chestnuts**
    Dr. Sandra Anagnostakis
    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**
    Dr. Sandra Anagnostakis
    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**
    Ms. Katherine Dugas, Ms. Rose Hiskes, Dr. Yonghao Li, Ms. Diane Riddle, and Dr. Gale E. Ridge
    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. **Composting Leaves Using the Static Pile Method**
    Since the 1991 ban on disposing leaves in landfills, large-scale leaf composting has spread throughout Connecticut. Some 84 municipalities are currently composting their leaves. In static pile composting, leaves are piled and the internal temperature of the pile is monitored. As the leaves decompose, the temperature in the center of the pile reaches a temperature of about 140ºF. When the temperature decreases, the pile is turned, and fresh material is introduced to the center of the pile. Turning also aerates the pile. Leaf compost is seen here in various stages of decomposition. The finished compost is used in experiments here at Lockwood Farm and at the Valley Laboratory in Windsor.

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. **The Big Dipper**
    Mr. Harry Rowe
    Our home-style ice cream is freshly made on the premises in small batches to insure 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 Road, Prospect, CT.

20. **Kids' Corner**
    Dr. Andrea Gloria-Soria
    Bring your children to the Kids' Corner to make fun crafts, 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 Number 21) to collect a CAES patch.

21. **Self-Guided Activity for All Children, Including Girl Scouts**
    Ms. Terri Arsenault
    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. In addition, Girl Scouts will have the option to earn the Naturalist Legacy badge appropriate for their level of scouting. On October 1, 2007, Girl Scouts of Connecticut became the largest organization of women and girls in Connecticut, serving over 47,300 girls. 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.

22. Farm Equipment Used at Lockwood Farm

Mr. Richard Cecarelli

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.

23. Experiment Station Associates

Ms. Cheryl Cappiali, President, Experiment Station Associates

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.

24. Phosphorous Trapped by Modified Biochar and Recycled as Fertilizer Using Arbuscular Mycorrhizal Fungi

Dr. Tyler Swanson, Dr. Philip Wang, Dr. Wade Elmer, and Dr. Joe Pignatello

Excess phosphate runoff can contribute to hypoxia, eutrophication, harmful algal blooms, and loss of commercial and recreational value of water bodies. The predominant sources of excess P include animal feeding operations, fertilizer and manure application to agricultural fields, non-point source runoff, and effluents from wastewater treatment plants. We previously showed that biochar particles coated with magnesium oxide (MgO-BC) can effectively trap inorganic P in manures or wastewaters. The tightly-bound P in the modified biochar (P-MgO-BC) is highly resistant to leaching and therefore poorly bioavailable. We now test whether P-MgO-BC can be used as a fertilizer by also inoculating the soil with arbuscular mycorrhizal fungi (AMF). AMF are natural soil microbes that can form a symbiotic relationship with plants by "mining" soil nutrients for the plant in exchange for carbon-rich substances from the plant that nourish the AMF. Lettuce will be grown in P deficient soil fortified with P-MgO-BC or conventional inorganic P in the presence or absence of AMF. We hypothesize that AMF will mine P from P-MgO-BC and transport it to crop roots, improving plant yield and health in relation to the controls without AMF. We also test whether magnesium in P-MgO-BC may be of benefit to the crop.

25. The Ministry of Molecular Magic

Dr. Christina Robb and Mr. John Ranciato

The Analytical Chemistry department has synthesized a range of experiments which demonstrate the roles of chemistry and energy in everyday life. We have both individually oriented experiments and group demonstrations. Learn scientific principles while having fun conducting or observing the experiments. Come and explore the wonders of science with us.

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

Dr. Zhouqi Cui, Dr. Amine Hassani, Dr. Blaire Steven and Dr. Quan Zeng

Microbiome are the assembly of microorganisms found in a specific environment. Members of 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. Microbiome could be found on leaves, stems, roots, flowers, and fruits of a plant. The plant microbiome is a key determinant of plant health and productivity. Audiences will be educated about general information about plant microbiome, methods to study it. We will use apple flowers as an example to illustrate the assembly, composition of microbiome and its impact to apple's resistance to a plant disease, fire blight.

27. POP-Produce Overwintering Program

Mr. Robert Durgy

The demand for fresh local produce has increased greatly over the past decade. Thanks to excellent work recently to promote the agriculture industry, the number of farms, farmers' markets, CSAs and direct school and institution sales are all on the rise. But farmers are now finding it difficult to keep up with a twelve-month demand. There are now ten winter farmers' markets in Connecticut. Farmers need innovative approaches to help meet this growing demand. The goal of the project is to establish a research center entitled the Produce Overwintering Program (POP). The research will be centered on the idea that many vegetable varieties can be planted in fall and overwintered. This will allow the plant to start growing earlier in spring than a grower could otherwise plant it. The first tests will be determining how to overwinter broccoli and cabbage seedlings, so they head in the spring. But variety trials and growing techniques need to be evaluated for many different crops for their appropriateness in Connecticut. POP will test varieties and develop growing techniques which are best suited for overwintering, so that the produce will be available for harvest early in the spring or late winter. The goal is to provide varieties and growing techniques that will increase the amount and variety of produce farmers can sell at winter markets, early spring markets and direct sales.

28. A World of Viruses

Drs. Zannatul Ferdous and Rebecca Johnson *Assisted by* Mr. 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.

29. Chestnut Research

Dr. Florian Carle (Yale University), Mr. Jack Swat (The American Chestnut Foundation), and Dr. Susanna Kerio (CAES)
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.

30. Potential of Nanomaterials as Tree Care Agents - Chestnuts as a Case Study

Drs. Susanna Keriö, Washington da Silva, Blaire Steven, and Nubia Zuverza-Mena *Assisted by* Mr. Aiden Florio, Ms. Jacqueline Lemmon, Ms. Jacquelyn LaReau, Mr. Joseph Barsky, Ms. Cora Ottaviani, and Ms. Madeleine Dumas
Tree health has critical importance for public health and habitability of urban areas. In Connecticut, nearly 90% of people live in urban areas and benefit daily from the urban forest cover. Tree health is currently threatened by intensifying abiotic and biotic stress. Severe droughts have become more common, which has increased tree mortality in forests and in urban areas. In urban areas, the conditions for tree growth are often suboptimal, which amplifies tree drought stress. Therefore, new management approaches to improve tree stress tolerance in urban and arboricultural settings are needed. We present results from a project that studied the impact of engineered nanomaterials on drought tolerance in chestnut seedlings. We will discuss the potential applications that engineered nanomaterials might have as tree care agents in arboriculture and silviculture.

31. Role of Foliar Biointerface Properties and Nanomaterial Chemistry in Controlling Cu Transfer into Wild Type and Mutant *Arabidopsis thaliana* Leaf Tissue

Dr. Yu Shen, Dr. Jaya Borgatta, Dr. Carlos Tamez, Dr. Wade Elmer, and Dr. Jason C. White
Although the use of nanoscale materials in agriculture is increasing, an understanding of the mechanisms of foliar uptake across the leaf surface and the role of material properties in that process remains incomplete. To jointly investigate the role of both leaf surface and Cu nanomaterial properties in particle accumulation, CuO nanosheets, CuO nanoparticles, $Cu_3(PO_4)_2$•$3H_2O$ nanosheets, and $CuSO_4$ were foliarly applied at 50 mg/L total Cu to the leaves of wild type *Arabidopsis* spp., as well as to mutants with increased or decreased cuticle thickness, or decreased or increased stomatal activity. In our research, CuO nanosheets, and $Cu_3(PO_4)2$•$3H_2O$ nanosheets are synthesized at the NSF Center for Sustainable Nanotechnology at the University of Wisconsin-Madison; and the experiment is carried out at the Department of Analytical Chemistry, the Connecticut Agricultural Experiment Station. In the experiment, we found that nanomaterial entry through the stomatal pathway is more important than is movement across the cuticle. These findings increase our understanding of the mechanisms of Cu nanomaterial attachment to and transfer across the plant leaf biointerface and enable optimization of material properties for effective and sustainable strategies as part of nano-enabled agriculture.

32. Response of Bare-Root Christmas Tree Transplants to Fertilizer at Planting

Dr. Richard S. Cowles
Most Christmas tree growers currently do not fertilize trees at the time of planting, probably from concern that salts from fertilizers can injure roots. Bare-root transplants during the year of planting usually turn yellow and have poor growth, signaling that they experience stress, and possibly indicating that there are mineral deficiencies during that year. The hypothesis central to this work is that the absorptive roots of bare-root transplants are insufficient for being able to obtain adequate plant nutrients to support plant health in the year of planting. Therefore, providing complete fertility by mixing controlled-release fertilizers into the soil while planting should compensate for these deficiencies and allow the trees to reach their full genetic potential for growth that year. Christmas trees of all species grown in Connecticut were shown to have improved color and growth following the planting hole incorporation of a controlled-release fertilizer with a 3-4-month release profile. Improved growth response of trees receiving fertilizer is usually seen in the second year after planting, and growers anticipate being able to harvest trees one year earlier with this practice.

33. *Phytophthora abietivora*, a New Species Isolated from Diseased Christmas Trees in Connecticut

Drs. DeWei Li, Neil P. Schultes, James LaMondia, and Richard Cowles

A number of fir species, are produced as Christmas trees. In particular, the Fraser fir, *Abies fraseri*, is popular as it yields high-quality Christmas trees in temperate North America and Europe. A *Phytophthora* sp. causing root rot on Fraser fir was isolated from a Christmas tree farm in Connecticut, and found to be a new species according to morphological study and molecular phylogenetic analysis using ITS, Cox1, β-Tub, Nadh1, and Hsp90 loci. Thus, it was described as *Phytophthora abietivora*.

34. Measuring Human Exposure to Per- and Polyfluoroalkyl Substances (PFAS)

Dr. Sara L. Nason *Assisted by* Ms. Elizabeth Lin and Dr. Krystal Pollitt (Department of Environmental Health Science, Yale School of Public Health)

PFAS are a group of man-made chemicals that are used in many products including firefighting foams, stainproof and waterproof coatings, Teflon™ pans, and food packaging materials. Additionally, they are widespread environmental contaminants that are present in many drinking water systems throughout the world. Recent evidence shows that PFAS can have toxic effects on humans at very low levels. At CAES, we are collaborating with researchers at the Yale School of Public Health to develop methods for measuring PFAS in human blood samples. Our methods use only small amounts of materials and have been adapted for both liquid blood and dried blood spot samples. With the methods we have developed, we plan to investigate PFAS levels in both current and archived blood samples and relate PFAS concentrations to disease occurrences.

35. 2021: Year of the Southern Pine Beetle?

Dr. Claire Rutledge *Assisted by* Ms. Mioara Scott and Ms. Ashley Martone

The southern pine beetle is native to the southern United States and Central America. It has been a leading cause of economic loss in Southern pine forestry for the past century. The beetles feed under the bark of 2 and 3-needle pines, and in sufficient numbers, can mass attack and kill healthy trees. In the epidemic form of their lifecycle, Southern Pine Beetle can kill thousands of trees over the course of one summer. Southern Pine Beetle has gradually move north with the warming climate and was detected in 2015 in Connecticut. The beetle has been trapped in extremely small but increasing numbers since then. The beetle has been in its endemic form, only attacking weak trees and hard to detect. Last summer, numbers of beetles trapped increased greatly. Will this be the year an epidemic breaks out?

36. Duration of Protection Provided by Different Fungicides in Boxwood Against Blight Disease

Drs. Srikanth Kodati, and James LaMondia

Boxwood blight caused by the fungal pathogen *Calonectria pseudonaviculata* has been a destructive disease affecting boxwood nursery production and valuable landscape plantings. Boxwood blight disease was first detected in boxwood nurseries in Connecticut and North Carolina. Currently, this disease is found on boxwoods grown in 28 states in the USA. Common management strategies include the integration of cultural and chemical control practices such as sanitation, tolerant cultivars, and chemical fungicides. Our aim of this study was to evaluate the duration of protection provided by a systemic fungicide, a copper product (Top Buxus), Actigard, and their combinations on two cultivars with different levels of susceptibility under controlled conditions. We conducted detached leaf experiments at 24°C with the leaves that were collected from fungicide treated boxwood plants. Results of our study showed that the systemic fungicide provided the longest duration of protection and inhibited production of spores. The copper product, Top Buxus, also provided significant protection in both the cultivars even at 26 days post application. Findings from this study will be helpful in selection of management methods for boxwood blight.

37. The Pavilion at Lockwood Farm

See program page 11 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 provide an open feel in the interior of the building.

38. Native Woody Shrubs

Dr. Jeffrey S. Ward *Assisted by* Mr. Joseph P. Barsky and Ms. Erin Reilly

Native woody shrubs offer an alternative to exotics commonly used in landscaping. This collection of shrubs was assembled in 1962 and in 1976 it was arranged in its present form with a dry site on the gravel mound and moist site in the shallow, plastic-lined depression. Many of these shrubs flower in the spring; their flowers can be seen in the photographs. Others, such

as sweet pepperbush, spirea, and buttonbush, flower in summer. Witch-hazel flower in early autumn. Birds are frequent visitors to the garden and quickly eat the mature fruit. These shrubs survive with minimal maintenance. Occasional mowing, annual removal of dead stems, and replenishment of mulch are performed. These shrubs have never been fertilized, watered, or treated for disease.

39. Bird & Butterfly Garden

Mr. Jeffrey Fengler and Ms. 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.

40. The Public Health and Entomology Tent

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

Dr. Philip Armstrong, Mr. John Shepard, Dr. Andrea Gloria-Soria, Ms. Angela Bransfield, Mr. Michael Misencik, and Ms. 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 86 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 3 million mosquitoes representing 47 different species have been collected, identified, and tested since 1997. A total of 2,583 WNV isolations have been recovered from 24 different mosquito species and a total of 536 isolations of EEEV isolations 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 (www.ct.gov/caes/mosquitotesting).

b. The Blacklegged Tick (Deer Tick) *Ixodes scapularis* and Lone Star Tick, *Amblyomma americanum*

Dr. Kirby C. Stafford III *Assisted by* Ms. Heidi Stuber, Ms. Jamie Cantoni, and Ms. Elizabeth Triana

The blacklegged tick or "deer" tick *Ixodes scapularis* carries six human pathogens including the agents of Lyme disease, babesiosis, and anaplasmosis. The lone star tick is the vector for the agents of ehrlichiosis. Observe live and/or preserved ticks under the microscope. The latest information on natural, biological, and integrated control is available.

c. An Integrated Tick Management Project for the Control of the Blacklegged Tick, *Ixodes scapularis*

Dr. Scott C. Williams, Dr. Kirby C. Stafford III, Dr. Megan A. Linske *Assisted by* Mr. Michael Short, Ms. Heidi Stuber, and Ms. Elizabeth Triana

A project evaluating the integrated use of host-targeted (deer 4-poster feeder stations and rodent bait boxes) and non-host targeted (applications of the entomopathogenic fungus *Metarhizium anisopliae*) methods for tick control is being conducted in Guilford, CT. A total of 81 properties over 7 neighborhoods are participating in the study. Of the 81 properties distributed across seven neighborhoods, 63 (9 in each of the 7 neighborhoods) received the various treatment combinations in 2018, 2019, and 2020. Reductions in both host-seeking ticks and ticks on white-footed mice were documented with the various treatment combinations.

d. Tracking Ticks and Tick-associated Diseases in Connecticut

Dr. Goudarz Molaei *Assisted by* Ms. Noelle Khalil, Ms. Alyssa Marini, Ms. Fiona Quigley, Ms. Tiba Alani, and Ms. Kayla Musante

Tick-borne diseases are posing increasing risk to public health, where in 2018, 2,234 and 47,743 human disease cases have been reported from Connecticut and the U.S., respectively, to the Centers for Disease Control and Prevention, with actual numbers estimated to be 10 times greater than reported. First described in 1977 following the investigation of a cluster of children with arthritis-like symptoms in Lyme, Connecticut, Lyme disease (LD) is now considered the most prevalent vector-borne disease in the U.S., with an estimated 330,000 diagnosed human cases annually. In 2018, nearly 85% of confirmed LD cases in the U.S. were reported from 15 states including Connecticut with the 4th highest number of confirmed cases of LD (n=1268) and 7th highest incidence rate (cases

per 100,000 persons) of 35.5. The blacklegged or deer tick is the primary vector of the bacterium that causes LD. In addition to LD, other blacklegged tick-associated diseases, particularly anaplasmosis and babesiosis, pose considerable risks to human health in Connecticut. It also appears that the relatively uncommon Powassan virus, which is transmitted to humans by blacklegged ticks, should be added to the growing list of pathogens of concern. Established in 1990, the Connecticut Agricultural Experiment Station-Tick Testing Laboratory (CAES-TTL) receives an average of 3000 ticks annually from residents, health departments, and physicians' offices for species identification, engorgement status, and pathogen testing. In 2020, the CAES-TTL received nearly 4,051 ticks, of which 86.9% were blacklegged ticks, 9.1% were American dog ticks, and 3.9% were lone star ticks. Of the 3,320 engorged nymph and adult female blacklegged ticks that were tested in 2020, 28.8%, 5.7%, and 6.6% tested positive for the causative agents of LD, anaplasmosis, and babesiosis, respectively. In addition, up to 2.8% of these ticks were identified positive for two or three of these disease agents, simultaneously. Native to the southeastern United States, the lone star tick has only recently begun to make its way to the northeast. Indeed, in 1996 just 0.2% of submissions received by the CAES-TTL were lone-star ticks and by 2020 this number had increased to 3.9%. In addition, we have recently documented range expansion of the native Gulf Coast tick and introduction of the invasive Asian longhorned tick, associated with numerous human diseases and medical conditions.

41. Ecology and Management of Grapevine Viruses in Connecticut

Dr. Washington da Silva

Our research program at CAES is addressing gaps in knowledge regarding the occurrence and distribution of the major grapevine viruses in Connecticut vineyards. The long-term goal is to implement effective IPM strategies to control grapevine virus diseases in this region in order to promote the sustainability of the state wine industry. Since 2018, we have visited 25 vineyards in the state and tested almost 3,000 vines for the presence of grapevine viruses. Over 50% of the vines were tested positive for grapevine leafroll associated viruses (GLRaVs), 6% for tomato ringspot virus (ToRSV), 5% for grapevine fanleaf virus (GFLV), and 27% of the samples were infected with multiple viruses. With these results in hand, we are educating growers of the detrimental effects of these viruses to the grape and wine industry in the region. Growers are now able to make management decisions (e.g., virus infected plant removal from their vineyards) with actual data.

42. How Do Plant Pathogens Enter Plants?

Ms. Felicia Millett and Dr. Quan Zeng

Plant pathogens often proliferate internally in the plants to cause infection. However, plant surface is usually covered with a cuticle layer that prevented foreign organisms to penetrate through such layer of defense. Thus, it is important to understand mechanisms of pathogens penetrating into the plant hosts. In this presentation, we will learn different modes of host entry by various pathogen groups including fungi, bacteria, and viruses. Fungal penetration, bacterial entry through natural openings and wounds, as well as viral entry through insect vectoring will be covered. We will also present research progress of using molecular methods to artificially label a bacterial plant pathogen, *Erwinia amylovora*, and use it to track the pathogen colonization on apple leaves. Findings showed that trichomes (leaf hairs) and hydathodes (water pores) represent sites of colonization and host entry points of *E. amylovora* on apple leaves.

43. Growing Cannabis in Connecticut - Crop Production and Pest Management

Dr. Quan Zeng

Cannabis is a genus of flowering plants in the family Cannabaceae. Two important species within this genus are *Cannabis sativa*, and *Cannabis indica*. Based on the use, the Cannabis crops are categorized into cannabidiol (CBD) production (hemp), seed and fiber production (hemp) and medical and recreational use (marijuana). In this presentation, we will discuss the biology, production, and pest and disease management of Cannabis. Plant classification, cultivation and harvest strategies, as well as common pests and diseases will be presented and discussed.

44. Invasive Aquatic Plant Program

Mr. Gregory Bugbee and Ms. Summer Stebbins *Assisted by* Ms. Sunayna Wahi and Mr. Adam Pakalnis

Connecticut lakes and ponds are degraded by the spread of non-native invasive plants. Plants such as Eurasian watermilfoil, variable watermilfoil and fanwort are of great concern because they disrupt native ecosystems, interfere with recreational uses, reduce property values, and can harbor harmful algae. Researchers in the Department of Environmental Sciences have documented our State's invasive aquatic plant problem from 2004 to present. Over 350 Connecticut lakes and ponds have been surveyed. We documented over 100 plant species, 14 of which are invasive. Approximately two-thirds of the waterbodies contained one or more invasive species. In 2010, we began resurveying lakes that were originally done over five years ago and are beginning to quantify long-term changes. In 2018, we discovered a new biotype of hydrilla in the Connecticut River and we are currently completing a survey of the entire Connecticut portion of the river. We have documented an extensive well-established population that threatens the river's wellbeing. We have found and continue to search for novel management options including reduced risk herbicides, biological controls, and winter drawdown. We also have developed models to predict at-risk lakes based on their water chemistry. Requests for Station assistance in managing

unwanted aquatic vegetation are common and we often visit water bodies to help solve imminent problems. At this plot you will see our aquatic plant surveillance boats, state-of-the-art global positioning systems and the underwater video equipment we use to conduct our 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 lakes and ponds.

45. Hemp Demonstration Plot

Dr. Walter Krol, Ms. Terri Arsenault, Mr. Richard Cecarelli and Dr. Christian Dimkpa

There is significant interest in growing hemp in CT; CAES has developed testing methods for total delta-9 THC and CBD that meet the needs of the Department of Agriculture's requirements for pre-harvest test samples. Previous work has shown that even when purchasing seed certified for THC compliance, that many varieties will still exceed the legally allowable level of THC if flowers are allowed to fully mature. Growers frequently try to time the harvest to maximize the CBD content without exceeding the THC compliance level, but work done at this plot has shown that this is a risky strategy because of the rapid rise in both THC and CBD as plant mature. Continuing work will examine strategies for maintaining THC compliance while maximizing CBD content, and remediating failed crops. In addition, work is beginning on amendments that might increase yield while decreasing fertilizer use.

46. Chestnut Species and Hybrids

Dr. Sandra Anagnostakis

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 plot #7). 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 Florida are planted across the road from an Allegheny chinquapin from Pennsylvania. The original tree (the "ortet") of the cultivar 'Lockwood' is at the southwest corner of the plot.

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

Dr. Victoria Lynn Smith *Assisted by* Ms. Tia Blevins, Mr. Mark Creighton, and Mr. Jeffrey Fengler

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 2020, the Office of the State Entomologist completed registration and inspections for 195 nursery growers and dealers of plants and plant products. Over 452 certificates of export were issued for plant commodities moving out of country, to 40 destination countries. Over 79 certificates of export were issued for plant commodities moving out of state, to 18 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 were conducted for a variety of exotic pests and diseases, including many non-native moths and wood boring insects. 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.

48. The Cooperative Agricultural Pest Survey (CAPS) Program and Plant Protection Act Surveys

Ms. Gerda Magana

The Cooperative Agricultural Pest Survey (CAPS) Program conducts science-based national and state surveys targeted at specific exotic plant pests, diseases, and weeds identified as threats to U.S. agriculture and/or the environment. These activities are accomplished primarily under USDA funding that is provided through cooperative agreements with state departments of agriculture, universities, and other entities. Surveys conducted through the CAPS Program represent a second line of defense against the entry of harmful plant pests and weeds. This year in Connecticut, CAPS pest surveys are being conducted in nursery sales yards, growing yards, and other high-risk sites. Part of the CAPS survey also will be including visual surveys for the spotted lanternfly. Additionally, CAES is also conducting a survey for vegetable crops pests and diseases with funding from the Plant Protection Act at Connecticut farms.

49. Biological Control of Hemlock Woolly Adelgid

Dr. Carole Cheah

Hemlock woolly adelgid, *Adelges tsugae* (HWA), is a serious exotic forest and nursery pest of native hemlocks in eastern North America. Recent severe winters from 2014-2018 with polar vortex events brought subzero arctic blasts, which widely reduced populations of HWA in the Connecticut landscape and gave our hemlocks a reprieve. However, the winter of 2020 was the 6th warmest on record in Connecticut with negligible HWA winter mortality. This was followed by another mild winter in 2021 with no polar vortex event to kill HWA. Connecticut is experiencing a resurgence of HWA, which is heavy in some areas. Biological control of HWA remains Connecticut's major strategy of managing HWA and saving the hemlock

forests. Long term data from release sites indicate the efficacy of this strategy with many original hemlocks surviving for over 20 years. From 1995-2007, >176,000 of the tiny HWA predatory ladybeetle, *Sasajiscymnus (=Pseudoscymnus) tsugae*, native to southern Japan, were reared at the Valley Laboratory and released in Connecticut's hemlock forests at 26 statewide sites, mostly on state lands. This HWA biological control program has been recently revived and expanded to include partnerships with land trusts, town conservation commissions, water companies, and other public and private preserves to release *S. tsugae* to combat the resurgence of HWA after mild winters. Tree-Savers of Pennsylvania is the sole commercial producer of *S. tsugae* and is an example of technology transfer of predator rearing methods developed at the Valley Laboratory which has allowed the public to access and implement biological control of HWA. Through purchases and generous donations of *S. tsugae* from Tree-Savers, augmentative releases of *S. tsugae* in Connecticut in 2017, 2020 and 2021 have increased to >50 hemlock sites. Currently, > 190,000 *S. tsugae* have been released throughout Connecticut since 1995.

50. 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).

51. Asian Chestnut Gall Wasp on Chestnut

Dr. Sandra Anagnostakis

Many of the chestnut trees hear 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 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.

52. Beach Plum Trials

Beach plum (*Prunus maritima* Marsh.) is a fruiting shrub native to the coastal dunes of the Northeastern United States. Beach plum jam has become a premium product especially in the Cape Cod region. Currently, consumer demand for beach plums is greater than the supply. Commercial production is the only way to meet the demand for beach plums and its relatively low growth habit makes it ideal for a pick-your-own operation. In its native seaside habitat, beach plums grow very slowly and bear fruit sporadically. Growth in more fertile soil should be more vigorous and crop size will be improved. In spring 2003, 210 beach plum seedlings were planted by Dr. Abigail Maynard (retired) at Lockwood Farm and 96 at the Valley Laboratory. These seedlings were raised at Cornell University from seeds collected from 35 sites from Maine to Delaware. The trees were evaluated annually. Growers now take cuttings from select elite individuals to be propagated as possible cultivars in the future.

53. Pawpaw Trials

Pawpaws are shrubby trees that are native to the temperate woodlands of the eastern United States. The American Indian is credited with spreading pawpaws across the eastern U.S. to eastern Kansas and Texas, and from the Great Lakes almost to the Gulf. They are woodland understory plants that need shade to protect the seedlings but once established prefer full sun. They produce maroon, upside-down flowers which are self-incompatible, requiring cross pollination from another unrelated pawpaw tree. They are not pollinated by bees but by flies and beetles. The pawpaw is the largest edible fruit native to America. Individual fruits weigh 5 to 16 ounces and are 3 to 6 inches in length. The tasty fruit has a smooth, custard texture. In this trial, 4 cultivars of pawpaws were planted by Dr. Abigail Maynard (retired) in 2002. Annual yields were recorded from each tree until 2019. The cultivars Rebecca's Gold and Overleese averaged the greatest yields (43 and 39 fruit/tree, respectively) with Sunflower producing the largest fruit (6.9 oz/fruit).

54. Hybrid and Vinifera Grape Cultivars Plot

Drs. Washington da Silva and Gale E. Ridge

Wine grapes and wineries are a relatively new industry to 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 maintaining 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.

55. Hops – Variety Evaluation and Integrated Pest Management

Dr. James A. LaMondia and Dr. Srikanth Kodati. *Assisted by* Ms. Michelle Salvas

There is wide interest in the production of locally grown hops among commercial growers, craft brewers, home brewers, and hobby gardeners. CAES scientists have established two hop yards with several cultivars using high and low trellis systems at the Lockwood Farm in Hamden and at the Valley Laboratory in Windsor. The main hop yards with five varieties have proven the general feasibility of successful hop production in CT. In 2016 and 2017, 23 more varieties were planted at Lockwood farm, in total 46 varieties over the last 4 years, and 10 more varieties were planted in Windsor. In 2018 we collected wild hops across CT for evaluation. We are currently evaluating growth, yield, disease resistance, and quality characteristics for this large number of hop varieties to enable growers to plant suitable varieties for successful commercial production. Not every variety does well in CT. We have also developed an IPM program for the most common diseases and pests such as downy and powdery mildew, two-spotted spider mites, potato leafhoppers, European corn borers, hop aphids and weeds. The IPM program includes cultural, biological, and chemical controls in a region-specific approach which includes intensive scouting and timely control measures.

56. Use of Nanoparticles Fertilizers on Plant Disease

Dr. Wade Elmer, Dr. Yi Wang, Dr. Yu Shen and Dr. Jason White

When metallic oxides of copper (Cu, and/or Si) are engineered at the nano size, they are called nanoparticles (NP). NP CuO have unique chemical and physical properties not observed in equivalent larger forms. We have observed that applying NP to young plants and/or seeds results in season long benefits. These plots are designed to examine several hypotheses. The effect of evaluating combinations of CuO on diseases of beets, eggplant, pumpkins, wheat, and zinnias will be addressed.

57. 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 4,000 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. www.cfba.org, joann@cfba.org, 860-768-1100

58. Connecticut Department of Agriculture

Jaime L. Smith and Rebecca Eddy

The Connecticut Department of Agriculture (CT DoAg) 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

59. US Dept. of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ)

Eric Chamberlain

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. https://www.aphis.usda.gov/aphis/ourfocus/planthealth

60. United States Department of Agriculture - Farm Service Agency (USDA-FSA)

Teresa Peavey

USDA FSA assists producers with commodity loans and programs, Ad-Hoc disaster programs, Non-Insured Crop Disaster Program Insurance for annually tilled crops not covered by RMA, Tree Assistance Program for Orchard or vine damage, Conservation programs and disaster assistance, Farm Storage Facility Loans for low interest financing of storage needs; Reports of Acreage to remain in compliance with FSA and NRCS programs; County Committees represent grassroots input and local administration of federal farm programs to local producers; Organic Certification Cost Share Program; Farm Ownership Loans; and many more programs. https://www.fsa.usda.gov

61. The Federated Garden Clubs of Connecticut, Inc.

Nan Merolla

The Federated Garden Clubs of CT, Inc. is an educational and charitable organization made up of over 6,200 members, 118 clubs and 26 affiliated organizations. We encourage high standards in all aspects of garden work and are dedicated to protect and conserve our natural resources, preserve our heritage and promote civic beauty. We offer National Garden Club Schools to the public as well as to our members in the areas of: Environmental, Flower Show, Gardening, and Landscape Design. We welcome opportunities to assist those in search of a garden club and are always delighted to participate in Plant Science Day. nan.merolla@gmail.com, ctgardenclubs.org

62. **Wild Ones – 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.wildones.org, wild.native.plants@gmail.com, 860-383-3580

63. **Levo International, Inc.**
Bill Heiden
Levo International is a non-profit organization dedicated to eliminating food insecurity through innovation and partnership. While it has delivered basic assistance to underserved urban neighborhoods in Connecticut and to some of the poorest regions of Haiti, Levo has continued its science and development programs focusing on simplifying hydroponic farming methods. With support of the Connecticut Agricultural Experiment Station, Levo is evaluating yield differences between constantly circulating hydroponics and the ebb and flow method it has deployed. This is an important addition to Levo's research and development efforts which also seek to develop effective natural fertilizers and fertilizer delivery methods, evaluate yield differences between hydroponic and traditional farming methods and to continue patent pending advances in simplified hydroponics. bheiden@levointernational.org, levointernational.org

64. **The Connecticut Tree Protective Association**
Cathy Dvorsky
The CTPA is a non-profit educational organization whose mission is to "Advance the care of CT trees." Currently, we have over 780 members, of whom approximately three-quarters are licensed arborists. About two-thirds of the licensed arborists in Connecticut are CTPA members. The majority of CTPA's members are licensed arborists, but the Association is not geared exclusively towards arborists. Anyone with a strong interest in trees is invited to join, with much to gain. www.ctpa.org, cathy@ctpa.org, 203-484-2512

65. **Sleeping Giant Park Association**
Julie Hulten
Sleeping Giant Park Association is an all-volunteer organization, founded in 1924 and dedicated to the expansion and preservation of Sleeping Giant as a State Park, with open space for recreational and nature study purposes. Our efforts include monitoring and controlling invasive plant species, invasive insect activity, maintaining a pollinator garden, trail maintenance, and educating the public in these areas. To encourage exploration of the Giant we offer at least 15 guided and/or themed hikes throughout the year and promote hiking through our Giant Master's program (hike all 32 miles for a badge and certificate). We welcome all who hold the Giant dear. www.sgpa.org, Julie.Hulten@gmail.com, 203 407-1818

66. **US Department of Agriculture Natural Resources Conservation Service (USDA–NRCS)**
Jacob Isleib
The Natural Resources Conservation Service (NRCS) is an agency of the United States Department of Agriculture with offices at six locations in Connecticut. For over 75 years, we have worked cooperatively with landowners, conservation districts, federal, state, and local governments, and citizens from urban and rural communities to restore, enhance, and protect natural resources. NRCS conservation specialists promote land stewardship by providing technical and financial assistance to agricultural and forest landowners and producers to address water quality and quantity; restore and protect habitat; improve air quality and energy conservation, and protect farmland from development. NRCS also provides soils and other natural resource information and analysis to help landowners and managers make informed decisions. For more information visit us at: http://www.ct.nrcs.usda.gov. NRCS will host a display with information about conservation and hands-on activities for kids. Jacob.Isleib@usda.gov, 860-871-4037

67. US Department of Agriculture Natural Resources Conservation Service SoilSHOP (USDA-NRCS SoilSHOP)
Meg Harvey, Connecticut Department of Public Health (CT-DPH), Tarah Somers, Agency for Toxic Substances and Disease Registry (ATSDR), Debbie Surabian & Jacob Isleib, United Station Department of Agriculture Natural Resources Conservation Service (USDA-NRCS)

Free soil screening for lead (Pb)! Bring a small (1-cup) soil sample from your home garden for on-site lead screening in less than 2 minutes. All testing is anonymous, no personal information is taken, and results are not recorded. CT-DPH and ATSDR staff will offer consultation regarding the results and discuss best practices to minimize risk of exposure to lead in soil.

Community and urban gardening offer numerous benefits. Some gardens and outdoor play areas may have harmful substances like lead in the soil. The Agency for Toxic Substances and Disease Registry (ATSDR), Connecticut Department of Health (CT-DPH) and USDA-NRCS promotes health education and outreach events called "soilSHOPs" to help people learn if their soil is contaminated with lead, and how to reduce exposures to contaminated soil and produce. The name soilSHOP stands for Soil Screening, Health, Outreach and Partnership. https://www.atsdr.cdc.gov/soilshop/index.html, Jacob.isleib@usda.gov, 860-871-4037

68. Connecticut Farmland Trust
Maddie Dres
The mission of Connecticut Farmland Trust is to preserve Connecticut farmland for current and future generations of farmers. CFT protects farmland, supports farmers, and advances the future of farming. Our goal is not just to protect Connecticut farmland but to ensure a vibrant future for Connecticut's diverse new generation of farmers. We believe that by keeping agricultural lands working and helping farmers, that all communities thrive. CFT will have a display table with information and membership brochures. farmlink@ctfarmland.org, www.ctfarmland.org, 860-247-0202

69. Connecticut Professional Timber
Brennan Sheahan
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. brennan@ctmulch.com, www.timproct.org

70. Southwest Conservation District
Chris Sullivan and Melissa Mostowy
The mission of the Southwest Conservation District is to provide technical assistance, information, and education in natural resource conservation and management to agricultural cooperators, landowners, and the public across 43 municipalities in southwest Connecticut. Improved soil conservation and water quality means healthier natural systems. These systems provide water for drinking, eating, bathing and recreational activities such as swimming. These same healthy systems create habitats for healthy organisms, both inland and on the coastal Long Island Sound. Improved habitats, protected natural resources, and native populations are also beneficial to human health. csullivan@conservect.org, https://conservect.org/southwest/

71. UConn Extension Master Gardener Program
Cheryl Cappiali
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. nhmastergardeners@gmail.com, https://www.uconnmastergardeners.com/

Index of Scientists' & Staff Names and their Field Plot Numbers

NAME	FIELD PLOT NUMBERS
Albertini, D.	
Ammirata, M.	Beverage Coordinator
Anagnostakis, S.	Emeritus Scientist, 3, 4, 7, 8, 13, 14, 46, 51
Anderson, J.	Emeritus Scientist
Andreadis, T.	Emeritus Scientist
Armstrong, P.	Barn (B), 40a
Arsenault, T.	Pavilion, Barn (B), 21, 45
Aulakh, J.	Barn (B), 12
Aylor, D.	Emeritus Scientist
Barsky, J.	PA System Coordinator, 12, 30, Native Shrub Walking Tour (38)
Blevins, T.	47
Bomba-Lewandoski, V.	Pavilion
Brackney, D.	Barn (B)
Bransfield, A.	40a
Bugbee, G.	Demonstration Tent, 44
Cantoni, J.	40b
Carney, S.	Registration, Connecticut Pesticide Credit Registration
Cavadini, M.	PA System Coordinator, Beverage Coordinator
Cecarelli, R.	Farm Manager at Lockwood Farm, 22, 45
Cheah, C.	49
Cowles, R.	32, 33
Cozens, D.	28
Creighton, M.	47
Cui, Z.	26
da Silva, W.	10, 11, 30, 41, 54
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Douglas, S.	Emeritus Scientist
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Durgy, R.	Farm Manager, Griswold Research Center, 27
Eitzer, B.	Barn (B)
Elmer, W.	9, 24, 31, 56
Fengler, J.	39, 47
Ferdous, Z.	28
Ferrandino, F.	Emeritus Scientist
Flores, E.	Maintenance
Gent, M.	Emeritus Scientist
Gloria-Soria, A.	20, 40a
Hannan, R., Jr.	Farm Crew, Lockwood Farm

Hart, B.	Maintenance
Hassani, M-A	26
Hiskes, R.	15
Huntley, R.	CAES Lunch Tent
Johnson, R.	28
Kaczenski-Corsaro, L.	39
Keriö, S.	29, 30
Khalil, N.	40d
Kodati, S.	36, 55
Krol, W.	Pavilion, Barn (B), 45
LaFrazier, R.	Maintenance
LaMondia, J.	33, 36, 55
LaReau, J.	30
Last, M.	Chief Financial Officer
Li, D.	33
Li, Y.	15
Linske, M.	Barn (B), 40c
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Maier, C.	Emeritus Scientist
Marra, R.	Pavilion, Lockwood Farm Walking Tour, Pesticide Credit Coordinator, PA System Coordinator
Mattina, M.	Emeritus Scientist
McHale, N.	Emeritus Scientist
Misencik, M.	40a
Molaei, G.	Registration, 40d
Musante, C.	Front Gate, Barn (B)
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Patel, R.	Barn (B)
Peterson, R.	Emeritus Scientist
Petruff, T.	40a
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Prapayotin-Riveros, K.	Photography
Preste, J.	Farm Manager at Valley Laboratory
Ranciato, J.	25
Rathier, T.	Emeritus Scientist
Riddle, D.	15
Ridge, G.	Barn (B), 10, 11, 15, 54
Robb, C.	25
Roman, M.	Maintenance
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Short, M.	Demonstration Tent, 40c
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Stafford, K., III	Pavilion, Barn (B), 40b, 40c
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Waggoner, P.	Emeritus Scientist
Wagner, E.	Maintenance
Wang, Y.	9, 24, 56
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Ward, J.	12, Native Shrub Walking Tour (38)
White, J. (CAES Director)	Pavilion, 9, 31, 56
Williams, S.	Demonstration Tent, Barn (B), 40c
Zarrillo, T.	1
Zelitch, I.	Emeritus Scientist
Zeng, Q.	26, 42, 43
Zuverza-Mena, N.	30

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.

Revised: July 9, 2018

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.

OFFICE AND MAIN LABORATORIES
123 Huntington Street; New Haven, CT 06511-2016, (203) 974-8500,
toll-free, statewide, 1 (877)-855-2237

VALLEY LABORATORY
153 Cook Hill Road; Windsor, CT 06095-0248, (860) 683-4977

LOCKWOOD FARM
890 Evergreen Avenue; Hamden, CT 06518-2361, (203) 974-8618

GRISWOLD RESEARCH CENTER
190 Sheldon Road; Griswold, CT 06351-3627, (860) 376-0365

THE EXPERIMENT STATION'S WEB PAGE: http://portal.ct.gov/caes
or just scan our QR code below with your smartphone.

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