

# The Connecticut Agricultural Experiment Station 109<sup>th</sup> Plant Science Day

Lockwood Farm, Hamden, CT  
Wednesday, August 7, 2019



# 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**

- Experiment Station Associates
- Publications & Information
- First Aid

**Barn B**

- Barn Exhibits
- Rest Rooms

**(R)** Registration

**(♿)** Parking for physically challenged

**(F)** Food Concessions

**(C)** Coffee & Cold Drinks

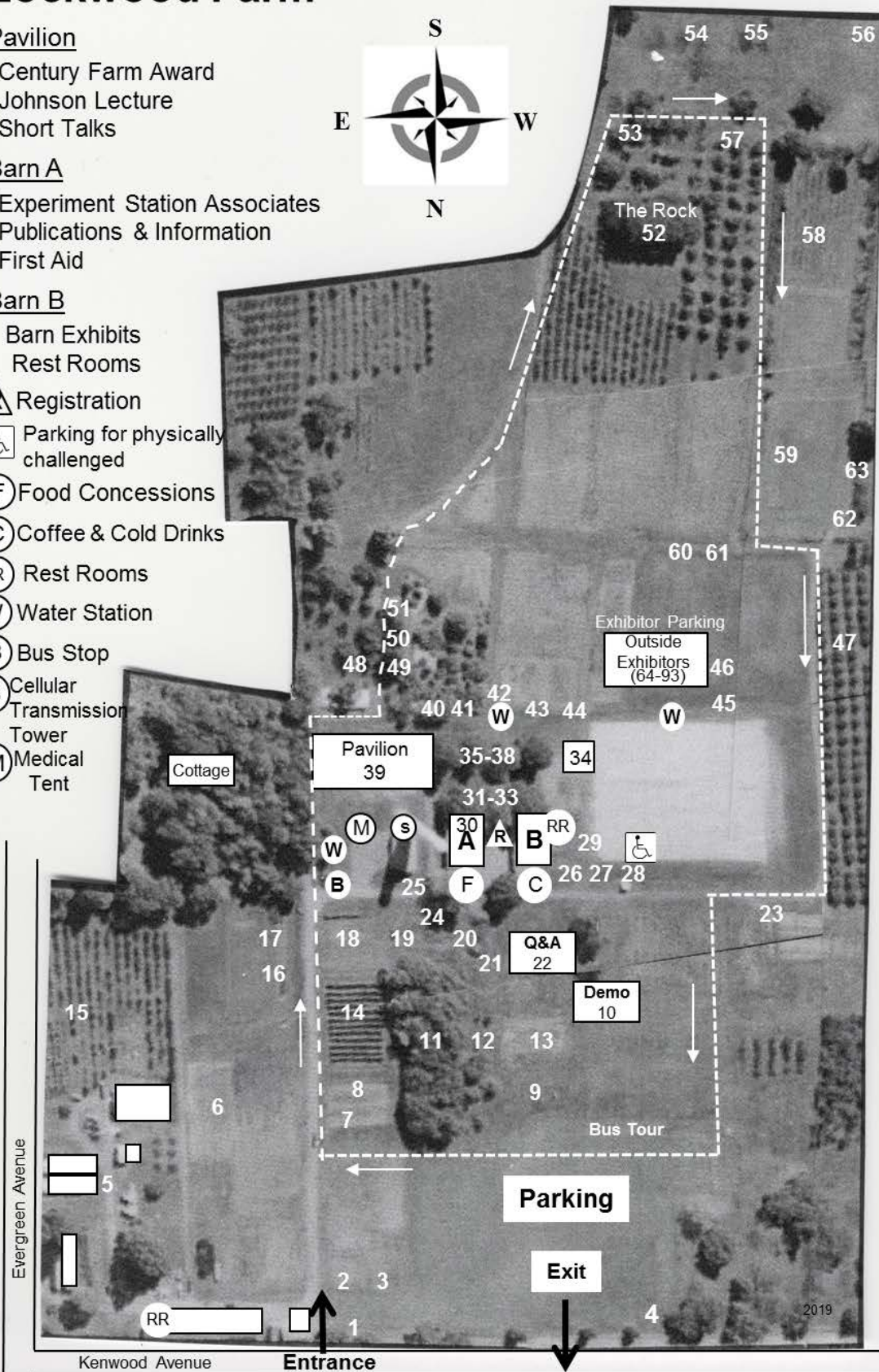
**(RR)** Rest Rooms

**(W)** Water Station

**(B)** Bus Stop

**(S)** Cellular Transmission Tower

**(M)** Medical Tent



2019

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 2019 Planning Committee**

Mr. Michael Ammirata  
Dr. Theodore Andreadis  
Ms. Terri Arsenault  
Mr. Joseph Barsky  
Ms. Vickie Bomba-Lewandoski  
Ms. Sandra Carney  
Mr. Michael Cavadini  
Mr. Richard Cecarelli  
Dr. Brian Eitzer  
Ms. Regan Huntley  
Mr. Michael Last  
Dr. Robert Marra

Dr. Abigail Maynard  
Dr. Goudarz Molaei  
Mr. Craig Musante  
Ms. Kitty Prapayotin-Riveros  
Dr. Neil Schultes  
Dr. Kirby Stafford  
Dr. Blaire Steven  
Mr. Peter Thiel  
Mr. Eric Wagner  
Dr. Jason White  
Dr. Quan Zeng

Program booklet created, compiled, and edited by Ms. Vickie Bomba-Lewandoski and assisted by Ms. Brandi Marks.



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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

## **2019 CONNECTICUT CENTURY FARM AWARD**

The Century Farm Award is given to a farm that has been in family operation for more than 100 years. The recipient is selected by the Connecticut Agricultural Information Council.

### **Hastings Farm, LLC Suffield, CT**

#### *Proclamation from Governor Ned Lamont:*

Hastings Farm is currently farmed by owners Lawrence and Susan Hastings, and their daughters Megan and Lauren, with help from extended family and several long time employees that are like extended family. The original 59 acres of the farm was acquired by Lawrence's grandfather Howard Hastings in 1916, a time when farms were quite diversified. There were sheep, pigs, tobacco, milking cows and a small orchard that comprised the farming activities. Consequently, each generation has purchased adjoining farms through the years with the last purchase of 47 acres in 2014 so that the farm now totals 200 acres, with 138 acres of that being preserved farmland.

By the 1930's the Hastings family had changed the focus of the farm to concentrate on milk and tobacco as the main crops, with the first milking machine and tractor on the farm, a Farmall F12, purchased in 1936. The old sheep barn was converted to a milking barn and an addition added to the barn in 1947 in order to increase the herd of milkers. In 1956, when Howard died and Richard Hastings (father of Lawrence) took over the farm the focus was changed again to only dairy production, and the old tobacco barns were converted to other uses such as cattle housing, a workshop and storage. Today only one of the sheds remains on the farm as a loafing barn for dry cows and heifers. The other 3 sheds on the farm were destroyed in the 1979 tornado that ripped through our area. The tornado was a blessing in disguise since it presented the opportunity to replace the old sheds with more efficient buildings better suited for their purposes. Also destroyed and rebuilt was a large section of the freestall barn that was built in 1972 when Richard and Lawrence were in business as partners.

In the 1990's the farm passed from Richard and Lawrence to Lawrence and Susan, and then in 2010 an LLC was formed with the next generation involved in the ownership and operation of the farm to ensure its continuance. In 2011 the focus of our products shifted once again to include processing of our milk on the farm, and a farm store, to take advantage of the benefit of value added products. Today our Greek style yogurt and Cream-Line milk can be found in grocery stores and farm markets throughout the state. A small herd of beef cattle can also be found wandering on the farm to provide our farm store with home grown grass feed beef.

Hastings Farm has become a blend of the old and new with the original barn dating from circa 1830, and listed on CTBarns.org, to the newest barn addition in 2016 to house the Delaval VMS robotic milker, the first of its kind in the state. With innovation, hard work, and a strong family bond we hope to be here for another 100 years.

## **THE SAMUEL W. JOHNSON MEMORIAL LECTURE (Pavilion)**

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

## **ANSWERS TO YOUR QUESTIONS (Plot 22)**

Staff members in the “question and answer” 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 27)**

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 28)**

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 E-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](http://www.facebook.com/CT.CAES))



Twitter ([www.twitter.com/CT\\_CAES](http://www.twitter.com/CT_CAES))



YouTube ([www.youtube.com/user/CTAGEXPSTATION](http://www.youtube.com/user/CTAGEXPSTATION))



Instagram

Instagram ([www.instagram.com/ct.caes/](http://www.instagram.com/ct.caes/))



Wikipedia ([http://en.wikipedia.org/wiki/Connecticut\\_Agricultural\\_Experiment\\_Station](http://en.wikipedia.org/wiki/Connecticut_Agricultural_Experiment_Station))



Pinterest ([www.pinterest.com/caes123](http://www.pinterest.com/caes123))

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



## E-ALERTS

The Connecticut Agricultural Experiment Station (CAES) E-ALERT service. We are inviting you to subscribe to our free E-ALERT e-mail service to receive CAES news updates by e-mail.

Follow this link <https://www.ct.gov/caes/guestaccount/login.asp>  to get started.

Once you have created your CT.gov profile you can now subscribe to our e-alerts.



## **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*

## 109<sup>th</sup> 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. Theodore G. Andreadis, Director**

**The Connecticut Agricultural Experiment Station**

**10:15 a.m. - 10:45 a.m. PAVILION**

**Dr. James A. LaMondia, Chief Scientist, Valley Laboratory**

***History of Broadleaf Tobacco Production in Connecticut***

Tobacco is a uniquely American plant with a long and interesting history. Many people are surprised to learn that tobacco species had been grown and used by Native Americans in the Northeast for about 2,000 years and that tobacco was grown by European colonists since before Connecticut even became a colony. Tobacco was one of the first and most important agricultural crops in Connecticut and has remained so for nearly 400 years. This short talk will present some of the history of tobacco types in the Americas and the development of the crop over time into the unique cigar wrapper types such as broadleaf, Havana and Connecticut Shade grown in the state. The role of science and plant breeding and the collaboration between growers and The Connecticut Agricultural Experiment Station in developing disease-resistant varieties will also be addressed.

**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.)*

**Dr. Abigail A. Maynard, Associate Agricultural Scientist, Department of Forestry and Horticulture**

***How to Grow the Best Tomatoes!***

There is nothing better than the taste of a freshly picked tomato from your garden. This demonstration talk will discuss ways to get a bountiful harvest year after year. We will start at the beginning with choosing the right varieties for your particular garden (heirloom or hybrid) (indeterminate or determinate). Growing transplants yourself will then be discussed as well as choosing the best transplants at the garden center. Now it is time to plant. What kind of conditions do tomatoes need? What kind of fertilizer is best? When is the optimal time to transplant tomatoes outside? Should tomatoes be mulched and, if so, what kind of mulch should be used? These and other questions will be answered. Suckering (or pruning) as well as staking and tying will also be demonstrated on tomato plants. While it is most likely too late for this growing season, hopefully this demonstration talk will give both new and experienced gardeners some ideas for next year. Also, you can visit plot 45 to observe heirloom tomato trials.

**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. DeWei Li, Agricultural Scientist/Mycologist, Valley Laboratory**

***Indoor Molds and Their Management***

This demonstration will discuss how to manage indoor molds including detection/inspection, sampling, and remediation. Molds are ubiquitous. In nature, molds play both beneficial and detrimental roles in ecosystems. Some molds can enter our homes or buildings and lead to mold infestation when water damage or dampness occurs. Exposure to indoor molds poses a health risk to building occupants. This is a legitimate public concern. Proper identification of molds can help determine the risk, as some molds may be more harmful than others. Determining the causal factors of mold infestation is crucial also. The best strategy to avoid a residence/building becoming moldy is proper management of water damage and dampness.

- 10:45 a.m. - 11:05 a.m. PAVILION**  
**CENTURY FARM AWARD**  
**Hastings Farm, LLC, Suffield, CT**
- 11:05 a.m. – 11:15 a.m. PAVILION**  
**EXPERIMENT STATION ASSOCIATES**  
**Mr. Skip Hobbs, *President, Experiment Station Associates***
- 11:15 a.m. – 12:00 noon PAVILION**  
***THE SAMUEL W. JOHNSON MEMORIAL LECTURE***  
**Mr. Keith B. Bishop, Co-CEO, Treasurer & Winemaker**  
**Bishop’s Orchards, Guilford, CT**  
***What Your Grandparents Couldn’t Teach You: Seven Generations of Adapting Stewardship***
- 1:15 p.m.-1:45 p.m. PAVILION**  
**Dr. Scott C. Williams, Associate Agricultural Scientist, Department of Forestry and Horticulture**  
***The Links Between Forest and Public Health***  
Over the past 12 years, our research has shown an increased abundance of blacklegged (aka: “deer”) ticks in forests infested with non-native invasive plants, particularly Japanese barberry (*Berberis thunbergii*). On the heels of our research, others have found similar associations with other non-native invasive plants such as Amur honeysuckle (*Lonicera maackii*) and multiflora rose (*Rosa multiflora*). Additionally, Ag Station scientists recently determined that in Connecticut, fragmented, residential settings had better habitat diversity and as a result, more abundant and greater wildlife diversity than mature forest stands, which resulted in decreased prevalence of *Borrelia burgdorferi*, the causal agent of Lyme disease. We suspect that “unhealthy” forests as defined by deer abundance, invasive species presence, stand age heterogeneity, stand size, etc., harbor increased abundances of blacklegged ticks and their associated pathogens. This will ultimately result in increased tick-borne disease occurrences in surrounding communities. Ag Station scientists are in the process of gathering statewide tick abundance data and correlating it with forest stand health in hopes of providing data to justify sound, scientific forest management. The results of our research will show the unequivocal connection between the health of Connecticut’s forests and the Connecticut public and further the Agricultural Experiment Station’s mission of “Putting Science to Work for Society.”
- 1:45 p.m.-2:15 p.m. PAVILION**  
**Dr. Lindsay R. Triplett, Assistant Agricultural Scientist, Department of Plant Pathology and Ecology**  
***The Carolina Gold Rush: Learning New Secrets from Heirloom Rice***  
Rice provides about one-fifth of all calories consumed by the human race, and rice farming has a major impact on the environment. As researchers look for ways to breed rice that can be grown more sustainably, ancient and heirloom rice varieties have emerged as a treasure trove of genetic material that could provide protection from disease, insects, drought, or flooding. One of the first food products exported by the American colonies was Carolina Gold Rice, a golden-hulled variety known for its delicate, nutty flavor. Thought to have been brought by traders from Madagascar in the 1640s, Carolina Gold created enormous wealth in the rice coast economy before production stopped in the early 20<sup>th</sup> century. Entrepreneurs and heirloom food enthusiasts recently started a new era of Carolina Gold farming, and their efforts have allowed CAES researchers and collaborators to discover that the rice has a new type of genetic resistance to an important global rice disease, and to gain clues about where the rice originated.
- 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.)*  
**Dr. Abigail A. Maynard, Associate Agricultural Scientist, Department of Forestry and Horticulture**  
***How to Grow the Best Tomatoes!***  
There is nothing better than the taste of a freshly picked tomato from your garden. This demonstration talk will discuss ways to get a bountiful harvest year after year. We will start at the beginning with choosing the right varieties for your particular garden (heirloom or hybrid) (indeterminate or determinate). Growing transplants yourself will then be discussed as well as choosing the best transplants at the garden center. Now it is time to plant. What kind of conditions do tomatoes need? What kind of fertilizer is best? When is

the optimal time to transplant tomatoes outside? Should tomatoes be mulched and, if so, what kind of mulch should be used? These and other questions will be answered. Suckering (or pruning) as well as staking and tying will be also be demonstrated on tomato plants. While it is most likely too late for this growing season, hopefully this demonstration talk will give both new and experienced gardeners some ideas for next year. Also, you can visit plot 45 to observe heirloom tomato trials.

**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. DeWei Li, Agricultural Scientist/Mycologist, Valley Laboratory**

***Indoor Molds and Their Management***

This demonstration will discuss how to manage indoor molds including detection/inspection, sampling, and remediation. Molds are ubiquitous. In nature, molds play both beneficial and detrimental roles in ecosystems. Some molds can enter our homes or buildings and lead to mold infestation when water damage or dampness occurs. Exposure to indoor molds poses a health risk to building occupants. This is a legitimate public concern. Proper identification of molds can help determine the risk, as some molds may be more harmful than others. Determining the causal factors of mold infestation is crucial also. The best strategy to avoid a residence/building becoming moldy is proper management of water damage and dampness.

**3:35 p.m.**

**TECHNICAL DEMONSTRATION TENT**

Adjourn Technical Demonstrations

**3:35 p.m. SIGN-OUT**

**(For those requesting pesticide credits) (R)**

Attendees can pick up their Pesticide Credit forms at the registration table (R).

**BUS TOUR (B)**  
**EVERY HALF HOUR, 10:00 a.m. to 3:30 p.m.**

**EVERY HALF HOUR** Take a ride in an air-conditioned bus, and learn about all the wonderful aspects of our research farm. You can be dropped off at any plot and/or get picked up the next time the tour comes around. Mr. Michael Cavadini, Dr. Abigail Maynard, and Dr. Neil Schultes will narrate the ride. This is a great way to see the farm.

Note: The bus will be suspended during the guest lecture from 11:00 a.m. – 12:00 noon.

**TOUR OF NATIVE WOODY SHRUBS (PLOT 40)**  
**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 40)**  
**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)**

### **Emerging Contaminants in the Environment and the Food Supply**

*Departments:* Analytical Chemistry and Environmental Sciences

*Investigators:* Dr. Sara L. Nason and Dr. Nubia Zuverza-Mena

*Abstract:* Emerging contaminants are pollutants that we have only recently become concerned about. They derive mainly from everyday items such as personal care products and pharmaceuticals that inevitably end up being released into the environment. Not enough is known about emerging contaminants to regulate their levels in the environment, but some have been linked to hormonal imbalances, organ toxicity and different types of cancer. At The Connecticut Agricultural Experiment Station, we are investigating several classes of emerging contaminants including nanoparticles and per- and polyfluoroalkyl substances. Our current work focuses on developing methods for detecting these pollutants in food, water, and soil, as well as learning more about how they can move through the environment and potentially enter the food supply.

### **Managing Mature Oak Forests in Connecticut**

*Department:* Forestry and Horticulture

*Investigator:* Dr. Jeffrey S. Ward

*Assisted by:* Mr. Joseph P. Barsky, Ms. Jessica Wikle (Yale University)

*Abstract:* Within the eastern upland oak forest, mature oak stands are an increasing component that currently occupies 13.3 million acres in the northeast and north central United States. In an eleven-year study in Connecticut, both traditional area-wide thinning and crop tree management increased individual tree diameter and volume growth in 80- to 125-year-old stands sufficiently to maintain stand volume growth comparable to unmanaged stands. Therefore, forest managers can prescribe an intermediate treatment to generate income for the landowner without sacrificing aesthetics or stand volume growth of the more valuable oak.

### **Phytophthora Root Rot Management in Christmas Trees**

*Department:* Valley Laboratory

*Investigator:* Dr. Richard S. Cowles

*Abstract:* High rainfall events, poorly-draining soil, and susceptible fir trees lead to heightened risk of losses from Phytophthora root rot, caused by several species of water molds. Over the course of four years after planting trees at a cooperating farm, 64% of Fraser firs died from root rot. Planting Canaan fir and lowering the soil pH from 6 to 4 reduced losses by 91%.

### **Passive Tick Surveillance for Assessing Human Health Risk**

*Departments:* Environmental Sciences and Entomology

*Investigators:* Dr. Goudarz Molaei and Dr. Eliza A. H. Little

*Assisted by:* Mr. Alex Diaz, Ms. Mallery Breban, Mr. Douglas Vuong

*Abstract:* *Ixodes scapularis*, commonly referred to as the blacklegged (deer) tick has pervasive populations in Connecticut and transmits a group of pathogens including those that cause Lyme disease (*Borrelia burgdorferi*), Babesiosis (*Babesia microti*), and Anaplasmosis (*Anaplasma phagocytophilum*). Populations of blacklegged ticks continue to expand geographically with increases in prevalence of infections and co-infections. We are using passive surveillance data, based on tick submissions to the Connecticut Agricultural Experiment Station-Tick Testing Laboratory and tick testing results to describe spatiotemporal patterns of infections in ticks and the risk of human diseases in Connecticut.

### **Hope for Ash Trees? Biological Control of the Emerald Ash Borer**

*Department:* Entomology

*Investigator:* Dr. Claire E. Rutledge

*Abstract:* The Emerald Ash Borer has killed thousands of trees in Connecticut since it was found in 2012. However, we have a way to fight back. Learn about the little wasps that are helping to protect our ash trees.

### **Ecology and Management of Grapevine Viruses in Connecticut**

*Department:* Plant Pathology and Ecology

*Investigator:* Dr. Washington L. da Silva

*Abstract:* Our research program at CAES is addressing gaps in knowledge regarding the occurrence and distribution of the major grapevine viruses in CT 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.



## **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>

**EMAIL US AT:** [CAES@CT.GOV](mailto:CAES@CT.GOV)

### **TO RECEIVE A COMPLETE LIST OF STATION SPEAKERS:**

Inquire at the publications table in BARN A, or write to:  
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](mailto:Vickie.Bomba-Lewandoski@ct.gov), or on the web at <https://portal.ct.gov/CAES/ABOUT-CAES/Speakers/Available-Speakers>

### **TO RECEIVE A COMPLETE LIST OF AVAILABLE EXPERIMENT STATION PUBLICATIONS:**

Inquire at the publications table in BARN A, or write to: 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](mailto:Vickie.Bomba-Lewandoski@ct.gov), or on the web at <https://portal.ct.gov/CAES/Publications/Publications/Publications>



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# Lockwood Farm

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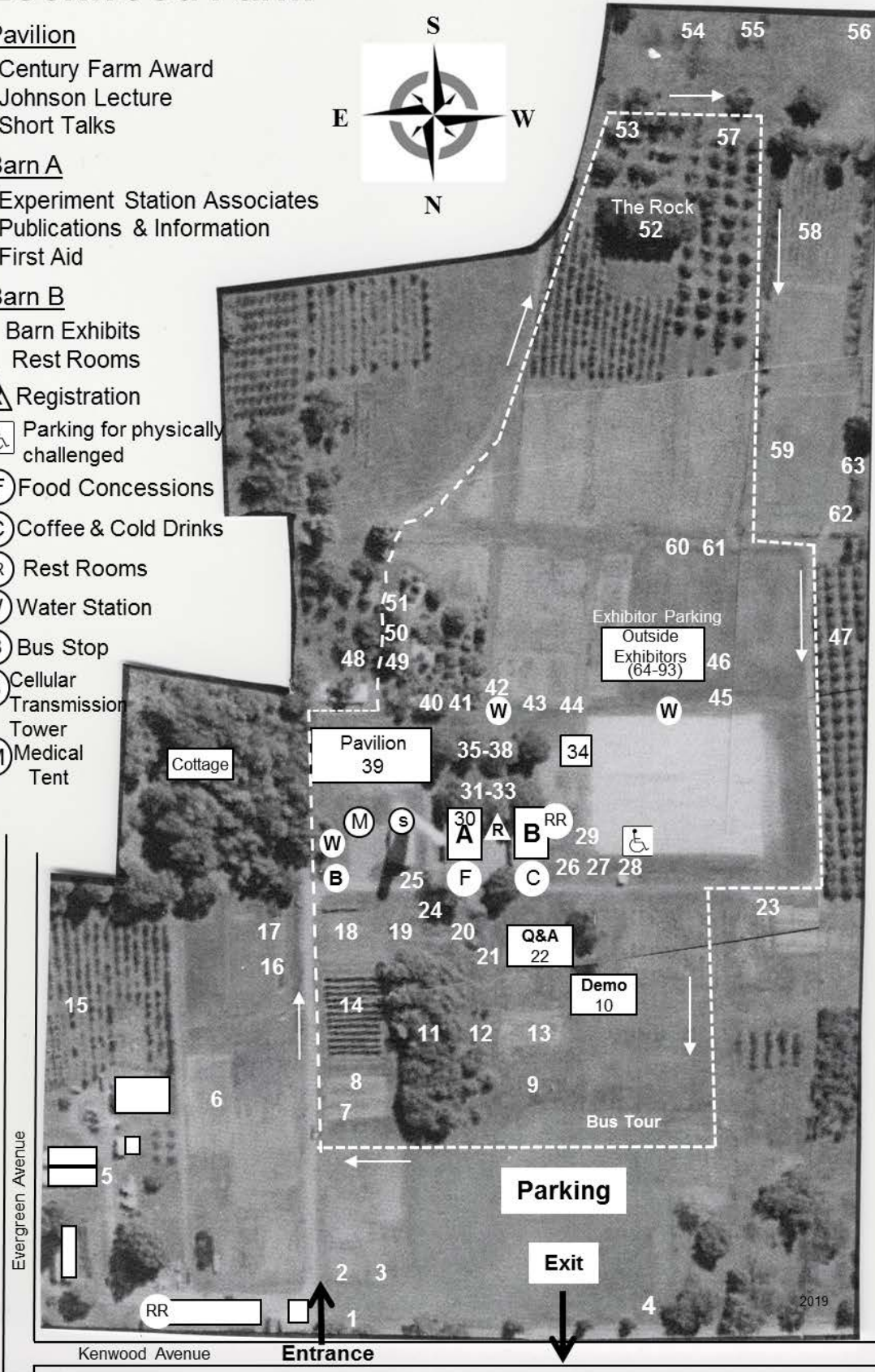
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**(S)** Cellular Transmission Tower

**(M)** Medical Tent



## **FIELD PLOT LISTING**

*Outside Exhibitors (Plots 24, 25, 26, 64-93) 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 Cecaelli and his Research Technicians Mr. Rollin Hannan and Mr. Michael McHill as well as seasonal resource assistants Mr. Joe Liquori, Mr. Michael Piercey Jr., and Mr. Harry Tokarz.

- 1. Chinese Chestnut Trees**
- 2. Sheet Composting with Maple and Oak Leaves**
- 3. Annual Production of Globe Artichokes**
- 4. Nut Orchard**
- 5. Fig Trials in Self-Watering Planters**
- 6. Use of Nanoparticles on Fusarium Crown Rot of Asparagus**
- 7. Commercial Chestnut Cultivars**
- 8. Commercial Chestnut Seedlings**
- 9. Remote Access Weather Station**
- 10. Technical Demonstration Tent**
- 11. Control of Blight on American Chestnuts**
- 12. New Hybrid Chestnut Orchard**
- 13. Use of Nanoparticles of Metal Oxides to Suppress Diseases of Plants**
- 14. Table Grape Demonstration Plot**
- 15. Environmentally-Friendly Control of Powdery Mildew on Landscape Plants**
- 16. Use of Experimental Fungicides for Suppression of Fusarium Wilt of Chrysanthemum**
- 17. Student Research: Chrysanthemum Wilt Disease Trial**
- 18. Powdery Mildew on Chardonnay Wine Grapes**
- 19. Seedlings of Old Surviving American Chestnuts**
- 20. Wild Chestnuts from Turkey**
- 21. Identification and Control of Weeds of Ornamental Plants**
- 22. Questions and Answers Tent**
- 23. Composting Leaves Using the Static Pile Method**
- 24. Hamden Police Department**
- 25. Crown Castle Cellular Tower**

26. **The Big Dipper**
27. **Kids' Korner**
28. **Self-Guided Activity for All Children, Including Girl Scouts**
29. **Farm Equipment Used at Lockwood Farm**
30. **Experiment Station Associates**
31. **Modification of Biochars for Nutrient Binding**
32. **Hands-On Chemistry**
33. **Use of Engineered Nanomaterials to Suppress Crop Diseases**
34. **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***
35. **A World of Viruses**
36. **Apple Flower Microbiome and Its Impact on Fire Blight Disease Development**
37. **POP-Produce Overwintering Program**
38. **Protists: Tiny Hunters of the Soil**
39. **The Pavilion at Lockwood Farm**
40. **Native Woody Shrubs**
41. **Bird & Butterfly Garden**
42. **Pollinator Visitation to *Zinnia* Varieties**
43. **Invasive Aquatic Plant Program**
44. **Hemp Demonstration Plot**
45. **Heirloom Tomato Variety Trials**
46. **Butternut Squash Trials**
47. **Organic Control of Fire Blight on Apples**
48. **Chestnut Species and Hybrids**
49. **Healthy Plants-Healthy Business: Support of The Green Industry by Inspection**
50. **The Cooperative Agricultural Pest Survey (CAPS) Program and Plant Protection Act Surveys**
51. **Biological Control of Hemlock Woolly Adelgid and Mile-a-Minute Weed**
52. **The Rock**

**53. Asian Chestnut Gall Wasp on Chestnut**

**54. Beach Plum Trials**

**55. Pawpaw Trials**

**56. Hybrid Elm Trees**

**57. Rocky Hill American Chestnut Trees**

**58. Pinot Gris Cultural Trials**

**59. Hybrid and Vinifera Winegrape Cultivar Trial**

**60. Storage Onion Trials**

**61. Sweet Potato Trials**

**62. Hops – Variety Evaluation and Integrated Pest Management**

**63. Suppression of Pumpkin Diseases with Nanoparticles**

**OUTSIDE EXHIBITORS (64-93)**

**64. Connecticut Botanical Society**

**65. UCONN Integrated Pest Management Team (IPM)**

**66. US Department of Labor Occupational Safety and Health Administration (OSHA)**

**67. Sleeping Giant Park Association**

**68. Hamden Alliance for Trees**

**69. Connecticut Forest and Park Association**

**70. Connecticut Invasive Plant Working Group**

**71. Connecticut Farm Bureau Association**

**72. US Department of Labor Wage and Hour Division (WHD)**

**73. Wild Ones – Mountain Laurel Chapter**

**74. US Department of Agriculture Farm Service Agency (FSA)**

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

**76. Federated Garden Clubs of Connecticut, Inc.**

**77. Lyman Hall High School Agricultural Science and Technology Program**

**78. Bartlett Arboretum**

**79. Agrivolution**

**80. Connecticut Farmland Trust**

**81. Connecticut Christmas Tree Growers Association**

- 82. Connecticut Environmental Council**
- 83. Connecticut Horticultural Society**
- 84. US Department of Agriculture Natural Resources Conservation Service (NRCS)**
- 85. Connecticut Department of Energy and Environmental Protection, Forestry (CT DEEP Forestry)**
- 86. Connecticut College Arboretum**
- 87. Connecticut Tree Protective Association**
- 88. Tree-Savers, LLC**
- 89. Connecticut Department of Agriculture (DoAg)**
- 90. US Department of Agriculture Natural Resources Conservation Service (NRCS) SoilSHOP**
- 91. South Central Connecticut Regional Water Authority**
- 92. UCONN Extension Master Gardener Program**
- 93. Connecticut Professional Timber Producers Association**

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



## **FIELD PLOT ABSTRACTS**

### **1. Chinese Chestnut Trees**

Dr. Sandra Anagnostakis

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

### **2. Sheet Composting with Maple and Oak Leaves**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

Many homeowners have a predominance of oak trees in their backyards. Oak leaves are known to be more resistant to decomposition than maple leaves. This experiment is investigating whether this difference in the rate of decomposition leads to decreased yields in soils amended with oak leaves compared to maple leaves and unamended controls. Undecomposed oak and maple leaves were layered about 6 inches thick in the falls of 1995-2018 and incorporated into the soil by rototilling. Yields from plots amended with oak leaves were compared to plots amended with maple leaves and the unamended controls. In 2018, the greatest onion yields were from plots amended with oak leaves (10.1 lbs./plot) followed by plots amended with maple leaves (9.8 lbs./plot) and the unamended control plots (7.2 lbs./plot). The greatest pepper yields were from unamended plots (2.9 lbs./plant) followed by plots amended with oak leaves (2.8 lbs./plant) and plots amended with maple leaves (2.6 lbs./plant). The greatest leek yields were from plots amended with maple leaves (1.6 lbs./leek) followed by plots amended with oak leaves and the unamended control plots (1.5 lbs./leek). Average yields of 12 vegetable crops over 23 years show no significant differences between the treatments.

### **3. Annual Production of Globe Artichokes**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

The globe artichoke, a biennial plant, grows vegetatively the first year and matures the second, sending forth its edible flower buds. When artichokes are grown from seed, this two-year cycle requires mild winters for survival and Connecticut's winter are too severe. The growth cycle of the plant, however, can be shortened by vernalization (moist chilling) of the seed or plant. This treatment initiates budding in 5- to 6-month-old plants and permits production of artichokes in a single year. Thus, the globe artichoke can be grown as an annual plant. In recent years, varieties of globe artichoke have been developed specifically for annual culture, requiring fewer hours of cool treatments. One is a green colored variety (Imperial Star); the other is a purple colored variety (Colorado Star), both of which can be seen in this plot.

### **4. Nut Orchard**

Dr. Sandra Anagnostakis

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

### **5. Fig Trials in Self-Watering Planters**

Dr. Charles R. Vossbrinck *Assisted by* Mr. Mario DiNatale

Figs promise to be a rewarding crop for agriculturists in Connecticut both for home gardeners and for commercial growers. For commercial applications, we have been testing 5 fig varieties in 25-gallon self-watering (sub-irrigation) pots and recording numbers, weight as a function of time for each tree. For the home gardener, we are testing trees in 7-gallon pots and recording fig numbers over time. Diseases we have encountered include mosaic virus, rust, spider mites, scale insects, and sooty mold. We are now beginning to plant figs outdoors to see if we can overwinter this semitropical fruit and produce figs by extending the growing season using low tunnels.

### **6. Use of Nanoparticles on Fusarium Crown Rot of Asparagus**

Dr. Wade Elmer *Assisted by* Mr. Peter Thiel

Asparagus plants suffer from a disease called Fusarium crown and root rot caused by species of the fungus *Fusarium*. Growers strive to establish a vigorous planting in the first few years to help suppress the disease. Metals of boron (B), copper (Cu), manganese (Mn), molybdenum (Mo), and Zinc (Zn) promote vigor in young plants. These plots were designed to compare the effect of the nano-metals on the vigor and stand establishment of asparagus. These metals were applied in the nano-form at planting as a crown soak. Fern health and disease severity will be monitored in 2018 and 2019. Yield will be taken in 2020.

### **7. 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.

### **8. 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.

### **9. Remote Access Weather Station**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

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.

### **10. Technical Demonstration Tent**

See program page 10 for a schedule of Technical Demonstrations.

### **11. 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.

### **12. 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.

### **13. Use of Nanoparticles of Metal Oxides to Suppress Diseases of Plants**

Dr. Wade Elmer, Dr. Roberto De La Torre-Roche, Dr. Nubia Zuverza-Mena, Dr. Chuanxin Ma, and Dr. Jason White *Assisted by* Mr. Peter Thiel

When metallic oxides of copper (Cu) or silicon (Si), are engineered at the nano size, they are called nanoparticles (NP). NP of 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 eggplant, soybean, and zinnia, and assessing NP of Si on watermelon will be addressed.

### **14. Table Grape Demonstration Plot**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

Three 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. Each row is trained to a different training system: Vertical Shoot Positioning, Hudson River Umbrella, and Smart-Dyson.

### **15. Environmentally-Friendly Control of Powdery Mildew on Landscape Plants**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

Many ornamental plants commonly used around Connecticut homes are subject to powdery mildew. This disease is caused by a fungus that grows on the surface of plant tissue giving the foliage a white powdery appearance. The result is relatively unsightly and

the fungus weakens infected plants by feeding on the sugar the plant produces and by blocking sunlight, which limits the ability of the plant to produce more sugar. This plot is planted to a number of common perennial landscape plants (lilac, deciduous azalea, bee balm, peony and phlox, rudbeckia (commonly called “black-eyed susan”), which are susceptible to powdery mildew. Environmentally-friendly foliar sprays, including milk (20% in water), potassium bicarbonate (1% in water), and light horticultural oil (1% in water), will be compared to chemical fungicides in their ability to control the disease.

#### **16. Use of Experimental Fungicides for Suppression of Fusarium Wilt of Chrysanthemum**

Dr. Wade Elmer *Assisted by* Mr. Peter Thiel and Southern CT State University Interns

Fungicides for control of Fusarium wilt of chrysanthemum caused by *Fusarium oxysporum* f. sp. *chrysanthemi* have been relatively ineffective and/or phytotoxic. This plot is designed to examine several new chemistries for their ability to suppress the disease and produce a marketable crop.

#### **17. Student Research: Chrysanthemum Wilt Disease Trial**

Ms. Kylee Brown, Mr. Carlos Calderon, Ms. Amanda DeLucia, Ms. Esther Kim, Ms. Kate Manning, Ms. Alenka Mora, Ms. Kawainohiaakalani Navares, Mr. Harvey Ng, Ms. Olivia Rianhard, and Mr. Ethan Tippet *Assisted by* Dr. Lindsay Triplett and Dr. Wade Elmer

Root-associated fungi cause many problems of ornamental plants, some with few treatments. In a summer group project, we tested the effects of three metal nanoparticles on the growth of Chrysanthemum and its resistance to wilt disease caused by *Fusarium* fungi.

#### **18. Powdery Mildew on Chardonnay Wine Grapes**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

Wine grapes and wineries are a relatively new industry in Connecticut. In the past 20 years, acreage planted to wine grapes has gone from 160 A to 620 A and the number of wineries has gone from 15 to 42, producing about 550,000 gallons of wine valued at between 12-14 million dollars per year. In our climate, powdery mildew has the greatest impact on wine-grape yield of all pathogens and pests. This plot is planted with Chardonnay vines, which are prized for the quality of the wine they produce, but are very susceptible to powdery mildew. Over the next few years the relation between the onset of powdery mildew and climate will be closely followed in order to attune disease-risk models to our local weather conditions.

#### **19. 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](http://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 interplanted 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.

#### **20. 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.

#### **21. Identification and Control of Weeds of Ornamental Plants**

Dr. Jatinder S. Aulakh *Assisted by* Ms. Anna Childress

Weeds compete with ornamental plants for nutrients, water, light, and space and reduce their growth and aesthetic value. A weed management decision depends on several concerns that include crop safety, weed control efficacy, economics, and environmental safety. Correct identification is very critical for selecting the right tool for weed management. The weed management booth will provide information on identification and control of key weeds of ornamental plants. Live specimens of weeds will be displayed and supplementary literature will be available as brochures. Visitors are encouraged to bring weed samples for identification and questions about chemical and non-chemical control options will be answered.

#### **22. Questions and Answers Tent**

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.

### **23. Composting Leaves Using the Static Pile Method**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

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 140°F. 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.

### **24. 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>.

### **25. Crown Castle Cellular Tower**

Learn about the cellular transmission tower.

### **26. 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](http://www.bigdipper.com), [harry@bigdipper.com](mailto:harry@bigdipper.com), (203) 758-3200, 75 Waterbury Rd, Prospect, CT.

### **27. Kids' Korner**

Ms. Terri Arsenault and Dr. Andrea Gloria-Soria

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 Girl Scouts' (plot 28) to collect a CAES patch.

### **28. 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.

### **29. Farm Equipment Used at Lockwood Farm**

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

### **30. Experiment Station Associates**

Mr. Skip Hobbs

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>.

### **31. Modification of Biochars for Nutrient Binding**

Dr. Joseph J. Pignatello *Assisted by* Dr. Philip Wang

Nutrient pollution can cause water quality degradation, ecosystem disruption, eutrophication, and loss of recreational value of water bodies. We have modified woody wastes converted into charcoal-like materials ("biochars") for superior ability to bind phosphate or

phosphate and nitrate. The modified biochars could be used to trap nutrients from animal wastes or wastewater, and then re-used by application to soil as a slow-release fertilizer. Biochars were modified in two ways and compared. In one, the woody waste was treated with magnesium salt solution before heating, leaving the biochar with nano-particles or films of magnesium oxide on its surfaces with high affinity for phosphate. In the other, the biochar was coated with a cationic polymer, making it strongly active for binding the negatively-charged phosphate and nitrate ions. Other modification strategies are being investigated to remove ammonium.

### 32. Hands-On Chemistry

Dr. Christina Robb, Dr. Walter Krol, Mr. John Ranciato, Mr. Michael Ammirata, and Dr. Jason C. White

This display will include a number of “hands-on” experiments that will allow you to get up close and personal with chemistry in action. You will not only get to “play” with our chemists but also CAES staff members will explain the mechanisms and principles behind the chemistry.

### 33. Use of Engineered Nanomaterials to Suppress Crop Diseases

Dr. Chuanxin Ma, Dr. Roberto De la Torre-Roche, Dr. Nubia Zuverza-Mena, Dr. Wade Elmer, Mr. Peter Thiel, and Dr. Jason C. White

Engineered nanomaterials (ENM) are ultrafine particles with at least one dimension smaller than 100 nanometers (one billionth of a meter). Due to their unique and useful properties, ENM have been used in areas such as electronics, cosmetics, pharmaceuticals, agriculture, and food processing. Preliminary findings suggested that nanoscale micronutrients could effectively suppress certain plant pathogens through enhanced crop nutrition. Thus, one area of research within the Department of Analytical Chemistry is to investigate whether customized ENM (specific surface coating, shape, size, etc.) can be “tuned” to more efficiently deliver the essential nutrients and suppress crop disease to a greater extent than other materials. In one set of experiments, plants were foliar-treated with novel copper ENM synthesized at the Center for Sustainable Nanotechnology at the University of Wisconsin-Madison and were then transferred into *Fusarium*-infested soil substrate. ENM distribution in plant tissues and plant responses as a function of dose and fungal infection were evaluated. In separate experiments conducted in collaboration with Harvard University and Nanyang Technological University in Singapore, we are developing nature-derived biopolymers (i.e., nanocellulose) as agrichemical delivery platforms. In one set of experiments, copper release from electrospun nanocellulose was investigated and the impact of this material on seed germination and crop growth was determined.

### 34. The Public Health and Entomology Tent

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

Dr. Philip Armstrong, Mr. John Shepard, Ms. Angela Bransfield, Mr. Michael Misencik, and Ms. Tanya Petruff *Assisted by* Ms. Kathryn Cleary, Ms. Caroline Cullen, Mr. William Cutrone, Mr. Patrick Daly, Mr. Aiden Floria, Ms. Noelle Khalil, Mr. Jack Miller, Mr. Michael Olson, Mr. Anthony Perugini, Ms. Demi Rodriguez, and Mr. Joshua Stumpf

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 92 mosquito-trapping stations in 72 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 52 different species have been collected, identified, and tested since 1997. A total of 2,358 WNV isolations have been recovered from 21 different mosquito species and a total of 412 isolations of EEEV isolations have come from 19 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 the 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](http://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. Sarah Hemstock, and Ms. Jamie Cantoni

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. Kirby C. Stafford III, Dr. Scott C. Williams, Dr. Megan A. Linske *Assisted by* Mr. Michael Short, Ms. Heidi Stuber, Ms. Bailly C. Willett, and Ms. Meagan de Nicolo.

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 and 2019. Reductions in both host-seeking ticks and ticks on white-footed mice were documented with the various treatment combinations.

### **35. A World of Viruses**

Dr. Doug Brackney *Assisted by* Dr. Josephine Hyde and 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.

### **36. Apple Flower Microbiome and Its Impact on Fire Blight Disease Development**

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

Microbiome refers to a community of microorganisms (such as bacteria, fungi, and viruses) that inhabit a particular environment. Although microbiome has been proven to affect general health and disease development in animals and humans (e.g., gut microbiome), its role in plant disease development is not well understood. In this research, we studied the role of microbiome associated with apple flowers in the development of fire blight, an important apple disease that infects plants through flowers. By comparing the microbiome associated with diseased and healthy apple flowers, we identified unique features of microbiomes and microbiome members correlating with disease development. Our study emphasizes the importance of microbiome in determining plant disease occurrence. It also serves as the basis of harnessing the “healthy flower microbiome” towards controlling fire blight disease as biological controls.

### **37. 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.

### **38. Protists: Tiny Hunters of the Soil**

Dr. Stephen Taerum and Dr. Blaire Steven *Assisted by* Ms. Kate Manning and Mr. Carlos Calderon

Protists are single-celled microorganisms that can live in soil and feed on bacteria or fungi. Soil contains hundreds of species of protists, and these organisms can help plants grow by recycling nutrients and encouraging the growth of helpful bacteria. We grew a plot of corn so that we could identify and study protists associated with the roots. This project will help us understand which protists grow near plant roots, and which ones might be helpful to plant growth.

### **39. The Pavilion at Lockwood Farm**

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

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

### **40. Native Woody Shrubs**

Dr. Jeffrey S. Ward *Assisted by* Mr. Joseph P. Barsky

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 flowers 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.

#### **41. Bird & Butterfly Garden**

Ms. Jane Canepa-Morrison, Mr. Jeffrey Fengler, Ms. Lisa Kaczynski-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.

#### **42. Pollinator Visitation to Zinnia Varieties**

Dr. Kimberly A. Stoner *Assisted by* Tracy Zarrillo, Morgan Lowry, James Durrell, Jeremy Day, Annie Bolduc, Heather Huminski, and Ben Gluck

Zinnias are tremendously popular ornamental plants, and they are also very diverse in genetics, flower structure, and color. The genus *Zinnia* is native to Mexico, Central America, and southwestern US, but zinnias first became popular as ornamental plants in Europe after *Zinnia violacea* was presented to the great Swedish taxonomist Linnaeus in 1796. By the mid-1800s, European plant breeders had developed zinnias in every color except blue and large, lush single and double-flowered varieties, and these became popular in North America. Commercial varieties have also been developed from the species *Zinnia angustifolia* and *Zinnia haageana*, and interspecies hybrids known as *Zinnia marylandica*. In our previous studies of the visitation of pollinators to ornamental plants, we noticed huge variation in visitation among different zinnia varieties, so this year we are studying the specific characteristics of 28 different zinnias in order to see which characteristics are associated with pollinator utilization.

#### **43. Invasive Aquatic Plant Program**

Mr. Gregory Bugbee *Assisted by* Ms. Summer Stebbins

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 water bodies 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. 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.

#### **44. Hemp Demonstration Plot**

Dr. Walter Krol, Ms. Terri Arsenault, Mr. Richard Cecarelli, and Dr. Jason C. White

There is significant interest in growing hemp in CT; CAES will be working directly with the CT Department of Agriculture for certain aspects of the regulatory testing that meets the needs of growers and protects consumers. For this demonstration plot, several seed sources were identified and different cultivars are currently being grown at Lockwood Farm. The plants will be harvested to enable the development of analytical methods for key constituents, including THC and CBDs, as well as an assessment of variability across cultivars. Future work will focus on how growth conditions can impact levels of these important analytes.

#### **45. Heirloom Tomato Variety Trials**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

In 2012, tomatoes were the most popular vegetable crop grown in Connecticut with 631 farms growing the fruit. According to an Experiment Station survey, 78% of tomato growers grow heirloom tomatoes. A strong market for heirloom tomatoes has developed because home gardeners and consumers seek tomatoes with excellent flavor in a variety of colors, shapes, and sizes. Consumers perceive that heirlooms taste better and have thinner skins than hybridized tomatoes. Heirloom tomatoes provide an excellent opportunity for local growers, despite several production problems. Most heirloom tomatoes have little disease resistance. In addition, because their skin is tender, heirloom varieties may crack easily. Earlier variety trials were conducted on heirloom tomatoes 2004-2006 and 2007-2009 in which a total of 57 varieties were evaluated. A 2018 catalog from Totally Tomatoes lists 138 different heirlooms. In this 3-year trial, we are evaluating the yield, quality, and disease resistance of 10 (previously not tested at CAES)

heirloom tomato varieties here at Lockwood Farm and at our Valley Laboratory at Windsor. Last year, Granny Cantrell had the greatest yields (46.7 lbs./plant) followed by Mrs. Maxwell's Big Italian (38.4 lbs./plant), Mule Train (37.7 lbs./plant), and Dester (35.3 lbs./plant). Golden Jubilee (28.4 lbs./plant) also produced consistently excellent quality fruit.

#### **46. Butternut Squash Trials**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

Winter squash varieties such as butternut, buttercup, acorn, and Hubbard have long been favorite fall crops for vegetable growers who operate roadside stands and attend farmers markets. An Experiment Station survey of vegetable growers found that 93% grow winter squash with butternut squash the most popular. Consumers often purchase by the bushel because they store well and can be eaten well into the winter months. Most squash varieties are long-vined and discourage home growers with limited space. New cultivars have been developed that produce fruit on shorter vines, allowing closer spacing. We are evaluating the yield and quality of 5 semi bush butternut squash varieties and comparing them to 5 traditional long-vined varieties. Last year, Atlas (semi bush) has the greatest yields (19.7 lbs./plant) followed by Ultra (long-vined) (19.1 lbs./plant). This 3-year trial is repeated at our Valley Laboratory in Windsor.

#### **47. Organic Control of Fire Blight on Apples**

Dr. Neil Schultes and Dr. Quan Zeng

Fire blight is a serious bacterial disease of apple and pears in Connecticut and in the United States. Most apple and pear varieties sought after by consumers, such as 'Gala', 'Fuji', and 'Bartlett', are either susceptible or highly-susceptible to fire blight. As the fire blight pathogens enter the plant through flowers during bloom, application of antibiotic streptomycin at bloom is by far the most effective management option for fire blight. However, the intensive, long-term use of streptomycin not only leads to the evolution of streptomycin resistance in the pathogen population, but also raises concerns of its potential impact to the environment and human health. On October 21, 2014, the National Organic Standards Board terminated the use of streptomycin in the organic fruit production in the US. We aim to develop effective, environmentally-friendly, non-antibiotic management options of fire blight. This plot demonstrates the 'Golden Smoothie' apple trees infected with fire blight. We are testing the efficacy of non-antibiotic treatments, a plant sanitizing product (hydrogen peroxide), and five different biological control agents, to the antibiotic treatment (streptomycin) in controlling fire blight.

#### **48. 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 #11). 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.

#### **49. 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. Jeff 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 2018, the Office of the State Entomologist completed registration and inspections for 201 nursery growers and dealers of plants and plant products. Over 346 certificates of export were issued for plant commodities moving out of state or out of country. Nearly 600 beekeepers registered 5,000 hives, and over 1,000 of these were inspected for diseases of honey bees. 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. 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.

#### **50. The Cooperative Agricultural Pest Survey (CAPS) Program and Plant Protection Act Surveys**

Ms. Katherine Dugas *Assisted by* Jacob Gross and Victoria Kamilar

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 in Christmas tree farms. Additionally, CAES is also conducting surveys for grape pests and diseases with funding from the Farm Bill, now called the Plant Protection Act, in Connecticut vineyards, including visual surveys for the spotted lanternfly.

#### **51. Biological Control of Hemlock Woolly Adelgid and Mile-a-Minute Weed**

Dr. Carole A. Cheah

Updates on the status of 2 Connecticut biological control programs are presented. Hemlock woolly adelgid, *Adelges tsugae* (HWA), a serious forest and nursery threat to native eastern and Carolina hemlocks, currently impacts 20 states in the Eastern U.S. and Canada. However, recent severe winters from 2014-2018 have greatly reduced populations of HWA in the Connecticut landscape. In addition, >178,000 of the tiny ladybeetle, *Sasajiscymnus* (= *Pseudoscymnus*) *tsugae*, native to southern Japan, were implemented by the CAES for biological control of HWA in Connecticut between 1995 and 2007 with recent new releases in 2017. This predator is now commercially available to the public to combat the resurgence of HWA after milder winters. Another threat to native vegetation diversity is the invasive mile-a-minute weed, *Persicaria perfoliata* (MAM). This non-native vine was initially reported in CT in 2000 but has now spread to 52 towns. As part of the federal biological control program for MAM (funded by USDA APHIS PPQ), >56,000 *Rhinoncomimus latipes*, a small weevil which feeds and reproduces exclusively on MAM, have been released between 2009 and 2018 to counter the spread of MAM. This project was a collaboration with the University of Connecticut since 2009 but is now being implemented by the CAES in 2019. Weevils have survived Connecticut winters, adapted to challenging environmental conditions and spread widely in many areas to feed on MAM.

## 52. 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).

## 53. Asian Chestnut Gall Wasp on Chestnut

Dr. Sandra Anagnostakis

Many of the chestnut trees here at Lockwood Farm are heavily infested with Asian chestnut gall wasp (*Dryocosmus kuriphyllis*). The insect was first detected in CT in 2011, but has done serious damage to commercial orchards in the mid-west and in Italy. We have been making crosses of susceptible trees with 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.

## 54. Beach Plum Trials

Dr. Abigail Maynard Assisted by Mr. Joseph Liquori

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 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 are evaluated annually and select elite individuals will be propagated as possible cultivars in the future.

## 55. Pawpaw Trials

Dr. Abigail Maynard Assisted by Mr. Joseph Liquori

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 in 2002. Since 2013, annual yields were recorded from each tree. Thus far, the cultivars Rebecca's Gold and Overleese have averaged the greatest yields (43 and 39 fruit/tree, respectively) with Sunflower producing the largest fruit (6.9 oz./fruit).

## 56. Hybrid Elm Trees

Dr. Sandra Anagnostakis

The late Eugene Smalley spent his whole career at the University of Wisconsin breeding elm trees for resistance to Dutch Elm Disease and for the tall, vase-shaped form of American elm trees (*Ulmus americana*). The problem with this kind of breeding is that American elms have four sets of chromosomes, and all the other species of elm have two sets. They bloom at different times, but stored pollen

can be used to make crosses. In 1992, Dr. Smalley sent us trees of Chinese elm (*Ulmus parvifolia*) and some of his successful crosses. Mortality has been high, but some of the trees still survive. A few of them look like good replacements for American elms as street trees.

### **57. Rocky Hill American Chestnut Trees**

Dr. Sandra Anagnostakis

Seed collected from selected American chestnut trees in a woodlot in Rocky Hill, CT in 1985 grew into the trees planted here. They are used as female parents in our crosses and are being treated with hypovirulence (see Control of Blight on American Chestnuts plot # 11) to keep them alive.

### **58. Pinot Gris Cultural Trials**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

A planting of 288 Pinot Gris vines was established in 2004. Half of the vines are on 101-14 rootstock, and the other half are on C3309. Vines on C3309 have had greater winter mortality and increased incidence of crown gall. Horticultural oil was applied at bloom in 2006-2008. Application of oil reduced photosynthesis and fruit set, resulting in less compact clusters that may be more resistant to late-season fruit rot diseases. This summer, the half acre plot is being used to measure detailed wind statistics in the vineyard.

### **59. Hybrid and Vinifera Winegrape Cultivar Trial**

Dr. Francis J. Ferrandino *Assisted by* Ms. Joan Bravo

This vineyard was planted in late spring, 2008. Some of the new cultivars are selections from breeding programs at Cornell University and the University of Minnesota and have not yet been released, while others are newly available cultivars from cool and cold climate areas of Europe. The new cultivars are being compared to established cultivars. Another smaller, cultivar evaluation plot has been established at the Windsor station.

### **60. Storage Onion Trials**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

Between 2007 and 2012, the number of farms growing onions increased over 400%. Onions are one of a few crops that can be marketed for several months after harvest. In this way, growers can sell onions in the fall and winter when most other vegetables are not available. In addition, onions are a good CSA crop in that they can be included in the farm offering every week. There are currently 76 CSAs in Connecticut. Twenty-five years ago, Experiment Station trials evaluated 35 varieties of Spanish and storage onions for yield, quality, and storage longevity. Only 3 of those varieties are still available. In this 3-year trial, we are evaluating the yield, quality, and disease resistance of 13 (previously not tested at CAES) storage onion varieties here at Lockwood Farm and at our Valley Laboratory in Windsor. In addition, onions from each variety will be placed in storage after harvest and evaluated monthly for seven months for their storage longevity.

### **61. Sweet Potato Trials**

Dr. Abigail Maynard *Assisted by* Mr. Joseph Liquori

A 1998 Connecticut Department of Agriculture survey showed that sweet potato is one of the most popular specialty vegetables. In the South, the sweet potato is also called yam, but both are identical species. In the United States, North Carolina and Louisiana are the leading producers where they are grown in hilled soil. Since they have a long growing season and thrive in warm soil, they have always been grown in the Northeast with black plastic mulch. However, black plastic mulch and hilling the soil increases both the labor and the cost per acre of producing the crop. In this trial, we are determining whether black plastic mulch and hilled soil are necessary for optimum production of sweet potatoes in Connecticut. We have 4 treatments: black plastic/flat soil, black plastic/hilled soil, no mulch/flat soil, and no mulch/hilled soil. In this way, we will determine the cultural method for growing sweet potatoes which is most productive and economically the most feasible.

### **62. Hops – Variety Evaluation and Integrated Pest Management**

Dr. James A. LaMondia and Dr. Elisha Allan-Perkins *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 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, hop aphids, and weeds. The IPM program includes cultural, biological, and chemical controls in a region-specific approach that includes intensive scouting and timely control measures.

### **63. Suppression of Pumpkin Diseases with Nanoparticles**

Dr. Wade Elmer, Dr. Roberto De La Torre-Roche, Dr. Nubia Zuverza-Mena, Dr. Chuanxin Ma, and Dr. Jason White *Assisted by* Mr. Peter Thiel

Pumpkins routinely get powdery mildew, a destructive disease caused by a pathogenic fungus. Growers typically spray pumpkin fields with expensive fungicides 5 to 8 times during the summer to suppress powdery mildew, which places exorbitant costs on the grower along with possible threats to the environment. In 2017, we observed suppression of powdery mildew with NP of Cu and Si applied only 3 times, where as in 2018, rainfall was very severe and differences were not observed. These plots are designed to compare only the CuO and SiO<sub>2</sub> treatments to conventional fungicides.

### **OUTSIDE EXHIBITORS (64-93)**

#### **64. Connecticut Botanical Society**

Truda Steinnagel, David Yih, Frank Kaputa, and Sigrun Nicodemis

We are a group of amateur and professional botanists who share an interest in the plants and habitats of Connecticut and the surrounding region. Since it was founded in 1903, we strive to increase knowledge of the state's flora, to accumulate a permanent botanical record, and to promote conservation and public awareness of the state's rich natural heritage.

We have goals to:

- 1) Build awareness of the botanical resources in other CT groups' beloved places, and in the neighborhoods of our members.
- 2) To have a site where people feel comfortable posting photos of plants and asking for help with ID, to encourage hands-on botany.
- 3) From a practical standpoint, a place to post weather updates and supplemental directions for the nearly weekly CBS field trips, and lectures and indoor programs as well.
- 4) A place to share informal photos of botanists exploring together, to increase membership and build our sense of camaraderie.
- 5) A place to resolve serious identification challenges or post photos of new varieties – for scientific feedback from the experts among us. [www.ct-botanical-society.org](http://www.ct-botanical-society.org); [www.facebook.com/pages/CT-Botanical-Society/486881834720804](https://www.facebook.com/pages/CT-Botanical-Society/486881834720804), and [www.facebook.com/CTNotableTrees](https://www.facebook.com/CTNotableTrees), [trudalynns@gmail.com](mailto:trudalynns@gmail.com), (860) 235-1914.

#### **65. UCONN Integrated Pest Management Team (IPM)**

Mary Concklin

UConn IPM Team members provide educational outreach for the commercial green industry, fruit and vegetable growers, and School IPM. Our exhibit will be of invasive insects, plants, and management of those, plus information on IPM. [www.ipm.uconn.edu](http://www.ipm.uconn.edu), [mary.concklin@uconn.edu](mailto:mary.concklin@uconn.edu), (860) 486-6449.

#### **66. US Department of Labor Occupational Safety and Health Administration (OSHA)**

Leona May

Our agency's purpose is to assure safe and healthy working conditions for working men and women. We have literature available on topics including, but not limited to: chemical safety, tree trimming, chain saws, wood chippers, heat stress, teen worker safety, and construction. Our local offices are located in Hartford and Bridgeport, CT. Hartford (860) 240-3152 or Bridgeport (203) 579-5583. [www.osha.gov](http://www.osha.gov), [may.leona@dol.gov](mailto:may.leona@dol.gov)

#### **67. 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](http://www.sgpa.org), [Julie.hulten@gmail.com](mailto:Julie.hulten@gmail.com), (203) 407-1818.

#### **68. Hamden Alliance for Trees**

Henry Dynia, Dick Hasbany

Hamden Alliance for Trees (HAT) is a grass roots organization which believes we need to balance the need to protect the electric grid and power delivery for residences and businesses with the need to preserve the town's urban forest (or tree scape). HAT works to educate the public on the aesthetic, economic, environmental, and societal benefits of trees and the importance of planting, nurturing and protecting our healthy trees. [hpdynia@yahoo.com](mailto:hpdynia@yahoo.com), (203) 228-2314.

#### **69. Connecticut Forest and Park Association**

Amelia Graham, Emma Kravet, and Lindsay Suhr

The Connecticut Forest & Park Association protects forests, parks, walking trails, and open spaces for future generations by connecting people to the land. CFPA directly involves individuals and families, educators, community leaders, and volunteers to enhance and defend Connecticut's rich natural heritage. CFPA is a nonprofit organization that relies on members and supporters to carry out its mission. [www.ctwoodlands.org](http://www.ctwoodlands.org), [agraham@ctwoodlands.org](mailto:agraham@ctwoodlands.org), (860) 346-8733.

#### **70. Connecticut Invasive Plant Working Group**

Charlotte Pyle

The mission of the Connecticut Invasive Plant Working Group is to gather and convey information on the presence, distribution, ecological impacts, and management of invasive species; to promote uses of native or non-invasive ornamental alternatives throughout Connecticut; and to work cooperatively with researchers, conservation organizations, government agencies, green industries, and the general public to identify and manage invasive species proactively and effectively. [www.cipwg.uconn.edu](http://www.cipwg.uconn.edu), [info@cipwg.org](mailto:info@cipwg.org), (860) 486-6448

#### **71. Connecticut Farm Bureau Association**

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](http://www.cfba.org), [joann@cfba.org](mailto:joann@cfba.org), (860) 768-1100.

#### **72. US Department of Labor Wage and Hour Division (WHD)**

Heather Callahan

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

#### **73. Wild Ones – Mountain Laurel Chapter**

Lydia Pan

Wild Ones ([www.wildones.org](http://www.wildones.org)) 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. An important focus of our activities is raising awareness about the importance of including native plants in urban & suburban gardens to support pollinators and other wildlife. We host monthly programs, most free and open to the public, on topics such as creating a rain garden, propagating native plants from seed, native pollinators and managing common invasive plants. Our programs also offer opportunities to see good examples of local native plant communities as they exist in nature as well as human-developed natural landscapes. Our outreach includes community partnerships to help restore native plant communities, to create native meadowscapes and to support native pollinators. In addition our exhibit will have lists of native plant alternatives, instructions for how to stratify seed and where to obtain seed-grown plants and seeds for species native to our ecoregion. [www.wildones.org](http://www.wildones.org), [lcpan01@gmail.com](mailto:lcpan01@gmail.com), (860) 383-3580.

#### **74. US Department of Agriculture Farm Service Agency (FSA)**

Teresa Peavey and Kathy Dangelo

USDA Farm Service Agency's mission is to conduct innovative FSA Marketing methods that:

- 1) Educate the public of FSA programs and services.
- 2) Eliminate informational barriers for farmers and ranchers.
- 3) Increase program awareness and participation from potential and current agricultural producers including underserved communities
- 4) Connecting people to the AG and conservation resources they need. <https://www.fsa.usda.gov>, [teresa.peavey@usda.gov](mailto:teresa.peavey@usda.gov), (203) 303-5527.

#### **75. US Dept. of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ)**

Charles Baker

APHIS-PPQ safeguards U.S. agriculture and natural resources against the entry, establishment, and spread of animal and plant pests and noxious weeds. Fulfillment of its safeguarding role ensures an abundant, high-quality, and varied food supply, strengthens the marketability of U.S. agriculture in domestic and international commerce, and contributes to the preservation of the global environment, [www.aphis.usda.gov](http://www.aphis.usda.gov), [charles.e.baker@usda.gov](mailto:charles.e.baker@usda.gov), (203) 741-5656.

#### **76. Federated Garden Clubs of Connecticut, Inc.**

Karin Pyskaty, Arlene Field, Polly Brooks, and Shirley Hall

The mission of the Federated Garden Clubs of Connecticut is to protect and conserve our natural resources, preserve our heritage and promote civic beauty. We offer member clubs and affiliates opportunities to participate in and contribute to the core mission and values of The Federation. We welcome new members by connecting those interested with existing clubs or helping to organize new clubs. [www.ctgardenclubs.org](http://www.ctgardenclubs.org), [jim.karin.pyskaty@gmail.com](mailto:jim.karin.pyskaty@gmail.com), (203) 915-1980.

#### **77. Lyman Hall High School Agricultural Science and Technology Program**

Emily Picard and students

Lyman Hall High School's Agricultural Science and Technology program offers enrollment to students from 9 sending towns, including West Haven, East Haven, Branford, North Branford, North Haven, Hamden, Meriden, Cheshire and Wallingford. Students have the option of focusing in agricultural mechanics, plant science, food science, large animal science, small animal science, veterinary science, aquaculture or wildlife biology over four years. The program follows the three circle model, incorporating FFA, Supervised Agricultural Experience (SAE) and classroom content into a comprehensive program for students. Students entering 8th grade who are interested in applying should talk to their guidance counselors in the fall or contact the ag science program directly. [www.LHAgEd.org](http://www.LHAgEd.org), [epicard@wallingfordschools.org](mailto:epicard@wallingfordschools.org), (203) 927-9193.

#### **78. Bartlett Arboretum**

Mike Belletzkie

The mission of the Bartlett Arboretum and Gardens is to provide a sanctuary and foster curiosity to explore, enjoy and learn about the habitats of the natural world. We accomplish this by:

- Preserving a 93-acre sanctuary of southwest New England natural ecosystems for generations to explore and enjoy
- Providing comprehensive environmental, horticulture and plant science educational programs for children and adults
- Providing opportunities for recreation, enjoyment and exploration of the natural world for all ages
- Maintaining a diverse collection of trees, gardens and plants that reflect biodiversity and the ecology of our region
- Promoting conservation and principles of sustainable landscape management

[www.bartlett.arboretum.uconn.edu](http://www.bartlett.arboretum.uconn.edu); [mbelletzkie@bartlettarboretum.org](mailto:mbelletzkie@bartlettarboretum.org), (203) 883-4035.

#### **79. Agrivolution**

Richard Fu

*Agrivolution* provides Controlled Environment Agriculture solutions for year-round pesticide-free fruits and vegetable production. We believe in distributed farming by embracing new agricultural technologies in order to create more local, sustainable, and resilient food systems. [www.agrivolution.co](http://www.agrivolution.co), [rfu@agrivolution.co](mailto:rfu@agrivolution.co), (888) 789-6587.

#### **80. Connecticut Farmland Trust**

Brianna Dunlap, Kathleen Doherty, and Lily Orr

Connecticut Farmland Trust is a statewide nonprofit organization working to protect farmland from the constant threat of development. Keeping land in farms helps establish a local, sustainable food system, supports our economy, and contributes to improving the quality of land, air, and water. Our goal is to make working lands available to Connecticut farmers for the indefinite future. [www.ctfarmland.org](http://www.ctfarmland.org), [bdunlap@ctfarmland.org](mailto:bdunlap@ctfarmland.org), (860) 247-0202.

#### **81. Connecticut Christmas Tree Growers Association**

Kathy Kogut, Dick Jaynes, and Joe Vignola

Our display will depict the Christmas tree from seed to sale. The Connecticut Christmas Tree Growers Association was organized in 1960 to encourage the development of the Christmas tree industry in the state of Connecticut. Our website is maintained for CCTGA members and for the public who buy "real" trees at Christmas. The site includes information about local tree farms, where to purchase trees, and how to care for them, and also provides a list of officers, members, and membership information. <https://www.ctchristmastree.org>, [wkogut@cox.net](mailto:wkogut@cox.net), (203) 641-1632.

#### **82. Connecticut Environmental Council**

Erica Fearn

The Connecticut Environmental Council unites individuals, businesses, and industry associations that engage in the responsible use of pesticides and fertilizers to beautify, protect, and promote healthy spaces and places. [www.CTenvironmentalfacts.org](http://www.CTenvironmentalfacts.org), [efearn@CTenvironmentalfacts.org](mailto:efearn@CTenvironmentalfacts.org), (860) 586-7508.

#### **83. Connecticut Horticultural Society**

Cheryl Marino



Established in 1887, **Connecticut Horticultural Society** is a 501(c)3 non-profit, membership-supported organization with an office in Rocky Hill. The society was established as a means for estate gardeners, florists and gardening enthusiasts to socialize, share their common interests and learn from each other. Its hallmark has always been an off-season speakers program featuring fine quality experts in the art and science of horticulture. CT Hort stands amongst an elite few donors who for the longest duration – 60 years – have supported the future of Connecticut horticulture with scholarships to UConn students. [www.cthort.org](http://www.cthort.org), [membership@cthort.org](mailto:membership@cthort.org); (860) 529-8713.

#### **84. US Department of Agriculture Natural Resources Conservation Service (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 land owners and managers make informed decisions. NRCS will host a display with information about conservation and hands-on activities for kids. <http://www.ct.nrcs.usda.gov>, [Jacob.isleib@usda.gov](mailto:Jacob.isleib@usda.gov), (860) 871-4037.

#### **85. Connecticut Department of Energy and Environmental Protection, Forestry (CT DEEP Forestry)**

Chris Donnelly and crew

DEEP Forestry performs a wide range of public services regarding the State of Connecticut's urban and rural forests. This includes forests on both public and private land. The Private and Municipal Lands component of DEEP Forestry will be out in force at Plant Science Day, as we have found it to be an excellent venue at which to make contact with our constituents, be that public officials, private forestland owners or just people in general interested in trees and in the welfare of the trees and forests in the state. [www.ct.gov/deep/forestry](http://www.ct.gov/deep/forestry), [chris.donnelly@ct.gov](mailto:chris.donnelly@ct.gov), (860) 424-3178.

#### **86. Connecticut College Arboretum**

Mary Villa, Leigh Knuttel, Bryan Goulet, Kraig Clark

The Connecticut College Arboretum provides a welcome connection with the natural world, offering opportunities for teaching, research, conservation, recreation and public education. The 750-acres Arboretum located in New London is open to the public seven days a week from dawn to dusk. We will be distributing maps and native plant information. [www.arboretum.conncoll.edu](http://www.arboretum.conncoll.edu), [mredfern@conncoll.edu](mailto:mredfern@conncoll.edu), (860) 439-5020.

#### **87. Connecticut Tree Protective Association**

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](http://www.ctpa.org), [cathy@ctpa.org](mailto:cathy@ctpa.org), (203) 484-2512.

#### **88. Tree-Savers, LLC**

Jayne Boniewicz, Justine Lishman, Kayla Zaleski

Hemlock Woolly Adelgid (HWA) is a relentless invasive pest that decimates hemlock trees and is damaging entire ecosystems across the Eastern United States. Chemical pesticides, the conventional approach to controlling this invasive pest, have failed to stop the devastation. Fortunately, nature has the answer for saving Hemlocks from death by HWA – the *Sasajiscymnus tsugae* (*S. tsugae*) beetle. This remarkable insect literally eats HWA for lunch (and breakfast and dinner!). *Tree-Savers* is here to balance the equation. We raise *S. tsugae* beetles in our specialized laboratory by the tens of thousands and send them into the fight to save hemlock trees from HWA. [www.tree-savers.com](http://www.tree-savers.com), [jayne@tree-savers.com](mailto:jayne@tree-savers.com), (570) 871-0088.

#### **89. Connecticut Department of Agriculture (DoAg)**

Rebecca Murphy

The Connecticut Department of Agriculture's 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. [www.CTGrown.gov](http://www.CTGrown.gov), [rebecca.eddy@ct.gov](mailto:rebecca.eddy@ct.gov), (860) 713-2503.

#### **90. US Department of Agriculture Natural Resources Conservation Service (NRCS) SoilSHOP**

Tarah Somers (ATSDR), Meg Harvey (CT-DPH), and Jacob Isleib (USDA-NRCS)

**SoilSHOPs** 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. This event will offer rapid soil sample screening



(provided by USDA-NRCS) for anyone that brings a sample from their garden area. The sample will be analyzed for lead and the analysis time only takes about 60 seconds. CT DPH and ATSDR staff will offer consultation regarding the soil analysis results and discuss best practices in regard to home use of soil resources to minimize risk of exposure to lead and other environmental contaminants. The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency of the U.S. Department of Health and Human Services. The Natural Resources Conservation Service (NRCS) is an agency of the United States Department of Agriculture (USDA) with offices at six locations in Connecticut. These two agencies are partnering with Connecticut Department of Public Health (DPH) to run a soilSHOP event. <https://www.atsdr.cdc.gov/soilshop/index.html>, [Jacob.isleib@usda.gov](mailto:Jacob.isleib@usda.gov), (860) 871-4037.

### **91. South Central Connecticut Regional Water Authority**

Kate Powell, Lisa DiFrancesco, Ron Walters, and Josh Tracy

The South Central Connecticut Regional Water Authority is a non-profit public corporation. We own more than 27,000-acres of land and provide a wide array of recreational opportunities and water-related services. Through our Whitney Water Center, we offer hands-on water science programs to thousands of students annually. On average, we supply 46 million gallons of water a day to a population of some 430,000 persons. We provide water and other services in all or portions of Ansonia, Bethany, Branford, Cheshire, Derby, East Haven, Hamden, Milford, New Haven, North Branford, North Haven, Orange, Seymour, West Haven and Woodbridge. We own land in Beacon Falls, Guilford, Killingworth, Madison, and Prospect. Our display emphasizes the importance of controlling invasive insect species in maintaining healthy land around our reservoirs and the impact on water quality. <http://www.rwater.com>, [kpowell@rwater.com](mailto:kpowell@rwater.com), (203) 777-1142.

### **92. UCONN Extension Master Gardener Program**

Cheryl Cappiali

The UCONN Master Gardener Program trains volunteers who provide science-based horticultural information to CT homeowners and collaborates with community organizations such as schools, community gardens, land trusts, and more. We have information on a wide variety of horticultural and environmental topics. The UConn Extension Master Gardener Program is an Educational Outreach Program of the University of Connecticut Extension System. New Haven County Extension Center, 305 Skiff St., North Haven, CT 06473, <http://mastergardener.uconn.edu>, [nhmastergardeners@gmail.com](mailto:nhmastergardeners@gmail.com), (203) 407-3168.

### **93. Connecticut Professional Timber Producers Association**

Brennan Sheahan

We represent the forest products industry within the state of Connecticut. We are a non-profit organization that works to educate and promote the forest products industry within our state. [www.timproct.org](http://www.timproct.org), [Brennan@ctmulch.com](mailto:Brennan@ctmulch.com), (860) 999-4741.

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

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## **History of The Connecticut Agricultural Experiment Station**

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

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

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

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

Some current research includes:

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

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



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.



Revised: Thursday, July 11, 2019, 3:54:53 PM

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The Connecticut Agricultural Experiment Station (CAES) prohibits discrimination in all of its programs and activities on the basis of race, color, religious creed, age, sex, marital status, veteran status, sexual orientation, gender identity, gender expression, national origin, ancestry, criminal conviction record, genetic information, learning disability, present or past history of mental disability, intellectual or physical disability, including, but not limited to blindness, of an applicant for employment or an employee, unless the mental disability or physical disability prevents adequate performance. To file a complaint of discrimination, contact Dr. Jason White, Vice Director, The Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven, CT 06504, (203) 974-8523 (voice), or [Jason.White@ct.gov](mailto:Jason.White@ct.gov) (e-mail). CAES is an affirmative action/equal opportunity provider and employer. Persons with disabilities who require alternate means of communication of program information should contact the Chief of Services, Michael Last at (203) 974-8442 (voice), (203) 974-8502 (FAX), or [Michael.Last@ct.gov](mailto:Michael.Last@ct.gov) (e-mail).

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