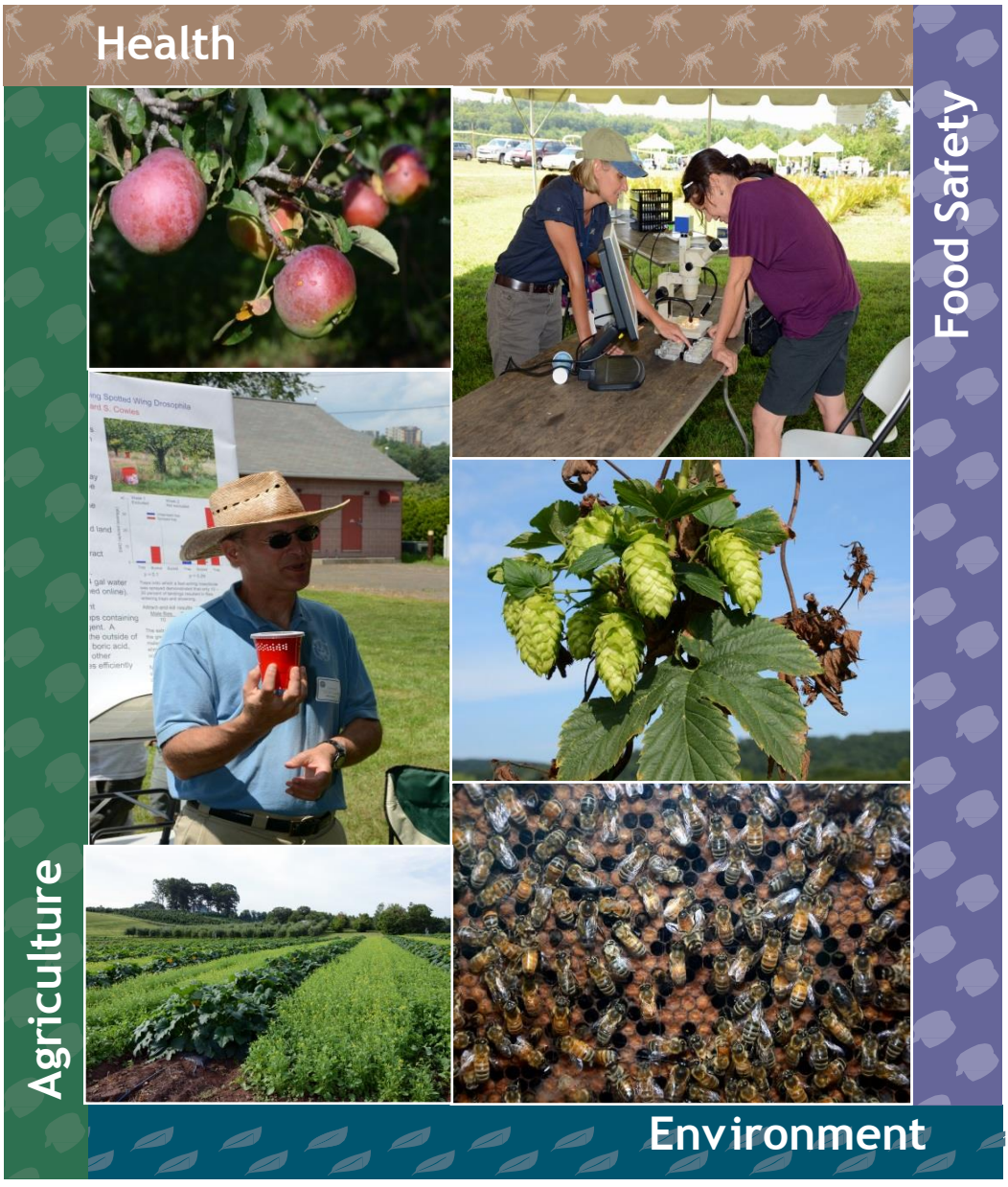
The Connecticut Agricultural Experiment Station
105th Plant Science Day

Lockwood Farm, Hamden, CT
August 5, 2015



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

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 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 2015 Planning Committee

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Program booklet created, compiled and edited by Vickie M. Bomba-Lewandoski, with assistance from Rebecca Carlone

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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: August 2014

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.

Anderson Farms
Wethersfield, Connecticut

Proclamation from Governor Dannel P. Malloy:

Anderson Farms, located in Wethersfield, was founded in 1854 by James R. Anderson who emigrated from Scotland to Connecticut. Red onions, tobacco and dairy were the principal commodities first produced on the farm. As the farm grew and prospered, James built a large Victorian style home that still graces the Broad Street Green in Old Wethersfield. In 1908, James Welles Anderson took over the farm from his father. A tuberculosis outbreak in 1931 brought an end to the dairy business and a fire that destroyed the tobacco shed ended tobacco production on the farm. James W. concentrated on market gardening, supplying the wholesale produce market and the Connecticut State Prison cannery in Wethersfield. In 1960, James Welles Anderson Sr. turned management of the farm over to his son David Clark Anderson, who became owner after his father's death and continues to operate the farm to the present. David's brother Jim assisted on the farm until his passing in 2009 and Jim's sons Craig and Christopher continue to work on the farm.

Currently, Anderson Farms sells a wide variety of vegetables and produce wholesale at the Hartford Regional Market, in direct sales to other farm stands and through retail sales at the farm. The farm has grown to over 140 acres producing various traditional New England vegetables. Most notable is the fresh spinach and sweet corn. Strawberries have been added as well as a greenhouse expansion for production of bedding plants and early tomatoes. A new building was constructed for washing, preparation and packaging produce for market and a walk-in cooler was also added. Anderson Farms was one of the first to use Integrated Pest Management, and works with the Great Meadows Conservation Trust and the Wethersfield Fish & Game Club. David maintains active memberships in the Hartford County and Connecticut Farm Bureaus, the Greater Hartford Farmers Market, Inc., and the Connecticut Vegetable Growers Association. David is also a member of the Board of Governors and a 50+ year member of Company #1, Wethersfield's Volunteer Fire Department, the oldest fire company in continuous existence in New England, founded in 1803.

As Governor, I am pleased to join The Connecticut Agricultural Experiment Station and the Connecticut Agricultural Information Council in presenting this Century Farm Award to Anderson Farms, who is most deserving of this honor.

THE SAMUEL W. JOHNSON MEMORIAL LECTURE (Main Tent)

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 20)

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 35)

Come to the Kids' Korner to pick up your child's passport and a goody bag. 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 36) to collect a CAES patch.

SELF-GUIDED ACTIVITY FOR ALL CHILDREN, INCLUDING GIRL SCOUTS (Plot 36)

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., collect signatures for the talks, demonstration, and tours you attended, and sign out to pick up your pesticide credit form at 3:25 p.m. at the registration desk (R).

Connecticut Pesticide Credits Offered: **ALL PESTICIDE LICENSE CATEGORIES including PRIVATE APPLICATORS (PA) / 4.50 Credit Hours.**

Keep current with The Connecticut Agricultural Experiment Station by using our SOCIAL MEDIA and E-ALERT resources.

SOCIAL MEDIA LINKS

Facebook (www.facebook.com/CT.CAES)

Twitter (www.twitter.com/CT_CAES)

YouTube (www.youtube.com/user/CTAGEXPSTATION)

(http://en.wikipedia.org/wiki/Connecticut_Agricultural_Experiment_Station)

To visit our webpage, go to www.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. Go to our website, scroll to the bottom left hand corner of our page, and click Receive Updates by e-mail e-ALERTS to get started.
Once you have created your CT.gov profile you can now subscribe to our e-alerts.

NO PETS, PLEASE. SERVICE ANIMALS ONLY.

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 main tent to eat lunch. Coffee and cold drinks are free.

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

105th 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 – Dr. Sharon M. Douglas, Head, Plant Pathology and Ecology

10:00 a.m. – 10:15 a.m. **MAIN TENT**
MORNING GREETING AND OPENING REMARKS
Dr. Theodore G. Andreadis, Director
The Connecticut Agricultural Experiment Station

10:15 a.m. - 10:45 a.m. **MAIN TENT**
Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology
Internal Decay in Trees and its Role in the Forest Carbon Cycle
Trees play an important role in mitigating climate change by storing carbon in the form of wood through photosynthesis and growth. Counteracting this process is wood decay, wherein CO_2 and other greenhouse gases are released back into the atmosphere as decay microorganisms metabolize wood. Assessing the internal condition of living trees nondestructively has been an elusive goal of forest pathologists, arborists, and scientists who study forest carbon cycles. The recent development of sonic and electrical resistance tomography, analogous to the medical CAT scan, has made this goal attainable. This talk will focus on Dr. Marra's research using tree tomography to quantify the impact of internal decay on carbon sequestration in forests.

10:15 a.m. – 10:35 a.m. **TECHNICAL DEMONSTRATION TENT**
(20 minute demonstration, repeated twice during the day, 10:15 a.m. & 2:30 p.m.)
Mr. Gregory J. Bugbee, Soil and Aquatic Ecosystem Scientist, Department of Environmental Sciences
Invasive Aquatic Plants That Threaten Lakes and Ponds
Nearly two thirds of Connecticut lakes and ponds contain problematic non-native invasive plants. What are they, where are they and how they can be controlled will be discussed in the context of over ten years of research by the CAES Invasive Aquatic Plant Program.

10:40 a.m. – 11:00 a.m. **TECHNICAL DEMONSTRATION TENT**
(20 minute demonstration, repeated twice during the day, 10:40 a.m. & 3:00 p.m.)
Mr. Mark H. Creighton, Apiary Inspector, Department of Entomology
Beekeeping Basics
Learn the "how to" on beginning beekeeping and how honey bees benefit agriculture. Join Apiculturist Mark Creighton with his education hive as he explains how just about everyone can raise honey bees in a backyard, and what they can do for your garden.

10:45 a.m. - 11:05 a.m. **MAIN TENT**
CENTURY FARM AWARD
Anderson Farms, Wethersfield, Connecticut

11:05 a.m. – 11:10 a.m. **MAIN TENT**
EXPERIMENT STATION ASSOCIATES
Mr. Will Rowlands, *President, Experiment Station Associates*

11:10 a.m. – 12:00 noon **MAIN TENT**
THE SAMUEL W. JOHNSON MEMORIAL LECTURE
Mr. Eric Hammerling
Executive Director, Connecticut Forest & Park Association
Protecting Forests in Connecticut for the Future – How are we doing? What will it take?

1:15 p.m.- 1:45 p.m. **MAIN TENT**
Dr. Blaire T. Steven, Environmental Microbiologist, Department of Environmental Sciences
From the Very Large to the Extremely Small: Including Microbiology in Climate Models
Microorganisms play critical roles in many of Earth's nutrient cycles, yet are generally ignored in most climate change models. Dr. Steven will discuss his work employing microbiology and genetics to characterize and predict how microbes will respond to a changing climate, primarily focused on Connecticut's coastal wetlands.

1:45 p.m.-2:15 p.m. **MAIN TENT**
Dr. Goudarz Molaei, Medical Entomologist/Vector Biologist, Department of Environmental Sciences
Tracking Ticks and Tick-associated Diseases in Connecticut
Lyme disease (LD) is the most prevalent tick-associated disease in Connecticut. Other infections such as anaplasmosis, babesiosis, and Powassan virus also occur in the state. The Connecticut Agricultural Experiment Station (CAES), in collaboration with the CDC and other partners, is conducting research on tick control measures, vaccine efficacy, and other aspects of tick-associated diseases. In addition, the CAES Tick Testing Laboratory is serving the residents of Connecticut by examining ticks for evidence of infection with LD bacterium and other pathogens.

2:15 p.m. **MAIN TENT**
Adjourn Main Talks

2:30 p.m. – 2:50 p.m. **TECHNICAL DEMONSTRATION TENT**
(20 minute demonstration, repeated twice during the day, 10:15 a.m. & 2:30 p.m.)
Mr. Gregory J. Bugbee, Soil and Aquatic Ecosystem Scientist, Department of Environmental Sciences
Invasive Aquatic Plants That Threaten Lakes and Ponds
Nearly two thirds of Connecticut lakes and ponds contain problematic non-native invasive plants. What are they, where are they and how they can be controlled will be discussed in the context of over ten years of research by the CAES Invasive Aquatic Plant Program.

3:00 p.m.-3:20 p.m. **TECHNICAL DEMONSTRATION TENT**
(20 minute demonstration, repeated twice during the day, 10:40 a.m. & 3:00 p.m.)
Mr. Mark H. Creighton, Apiary Inspector, Department of Entomology
Beekeeping Basics
Learn the "how to" on beginning beekeeping and how honey bees benefit agriculture. Join Apiculturist Mark Creighton with his education hive as he explains how just about everyone can raise honey bees in a backyard, and what they can do for your garden.

3:20 p.m. **TECHNICAL DEMONSTRATION TENT**
Adjourn Technical Demonstrations

3:25 p.m. SIGN-OUT **(for those requesting pesticide credits) (R)**
Attendees pick up Pesticide Credit forms at the registration table (R).

PESTICIDE CREDIT TOUR
(Meet at Barn A)
12:00 p.m.-1:00 p.m.

12:00 p.m. – 1:00 p.m. **MEET AT BARN A Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology**

A one-hour guided tour of selected field plots will be conducted by Dr. Robert E. Marra. Participants can discuss experiments and topics with scientists at each station on the tour.

Stops on tour:

- **How does biochar added to soil reduce emissions of the potent greenhouse gas, nitrous oxide?**
  Drs. Joseph J. Pignatello and Feng Xiao, (Plot #51)
  Biochar is a charcoal-like product of biomass waste materials, such as forest litter and crop residue. It is made by heating the wastes at high temperature in the absence of air. Biochar has attracted interest as a soil amendment in agriculture due to its reported positive effects on soil fertility. An unexpected benefit of biochar addition to soil is a reduction in the release of nitrous oxide (N_2O), the third most important greenhouse gas after carbon dioxide and methane. Nitrous oxide is produced by bacteria during the natural cycling of nitrogen, but currently about 30-44% of global emissions originate from the use of manure and nitrogen fertilizers. At the present time, the underlying causes of nitrous oxide suppression in soil by biochar are unknown, and it is not clear how long-lasting the effects will prove to be. Most research to date is based on the assumption that biochar works indirectly by affecting the numbers and/or activities of key bacteria involved in the nitrogen cycle. However, we have found that biochar itself binds nitrous oxide molecules strongly, and to some degree irreversibly, within its pores. Strong binding could explain emission suppression, at least over the short term. We have sought to characterize the key physical and chemical properties of biochar responsible for its ability to adsorb nitrous oxide by varying the feedstock and heating conditions used to make the biochar.

- **Environmentally-friendly control of fire blight on apples**
  Dr. Quan Zeng, (Plot #56)
  Fire blight is a serious bacterial disease of apples 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 21st, 2014, the National Organic Standards Board terminated the use of streptomycin in organic fruit production in the US. We aim to develop effective, environmentally friendly, non-antibiotic management options for fire blight. This plot demonstrates the 'Golden Smoothee' apple trees infected with fire blight. We are testing the efficacy of non-antibiotic treatments, a plant sanitizing product (hydrogen peroxide), and a biological control agent (a yeast strain), to the antibiotic treatment (streptomycin) in controlling fire blight.

- **An experimental deer repellent trial for the homeowner's backyard vegetable garden**
  Dr. Scott C. Williams, (Plot #47)
  Chronically overabundant white-tailed deer are the source of both headache and heartbreak for many Connecticut agricultural professionals and backyard gardeners. Without physical exclusion, planting browse-resistant plant species and the use of effective deer repellents are essential for Connecticut gardeners. However, because most commercial deer repellents formulations contain allergens and both foul-smelling and -tasting ingredients, they are not labeled for use on produce meant to be consumed by humans. Working collaboratively with staff from Bobbex, Inc. of Monroe, CT, we are investigating the effectiveness of an experimental deer repellent formulation that does not contain allergens and could potentially be used to protect produce grown in backyard gardens from deer and possibly other mammalian pests such as rabbits, woodchucks, and small rodents. We have two experimental gardens on private lands

in Redding and Guilford where we are testing the formulation's effectiveness as compared to plants that are fenced to those with no protection. Results should be forthcoming at the end of the growing season.

TOUR OF NATIVE WOODY SHRUBS (PLOT 48)

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 48)**
Dr. Jeffrey S. Ward, Station Forester, Department of Forestry and Horticulture
A ½-hour guided tour of our native shrub planting to be conducted by Dr. Jeffrey S. Ward, Station Forester and Head, Department of Forestry and Horticulture. Learn about using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

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

2:35 p.m.–3:35 p.m.

2:35 p.m. - 3:35 p.m. **MEET AT REGISTRATION DESK (R) Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology**
A one-hour guided tour of selected field plots will be conducted by Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology. Participants can discuss experiments and topics with scientists at each station on the tour.

STOPS ON WALKING TOUR, Approximately ½ mile, moderately hilly

- **The Rock**
  (Plot 61)
  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).

- **Beach Plum Trials**
  Dr. Abigail Maynard and Dr. David Hill Assisted by C. McCarthy, (Plot 63)
  Beach plum (*Prunus maritime* 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.

- **PawPaw Trials**
  Dr. Abigail Maynard and Dr. David Hill Assisted by C. McCarthy, (Plot 64)
  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. Annual yields are recorded from each cultivar.

- **Japanese Plum Variety Trials**
  Dr. Abigail Maynard and Dr. David Hill Assisted by C. McCarthy, (Plot 65)
  As wholesale marketing of major tree fruits becomes unprofitable, many Connecticut growers are turning to retail sales of their fruit. For a retail operation to be successful there must be a diversity of products. Thus, many growers are interested in adding minor specialty fruits to their operations. Consequently, we have expanded our New Crops Program to include fruits. This trial, also repeated at the Valley Laboratory in Windsor, includes 12 cultivar/rootstock combinations of Japanese plum. Many trees were severely damaged by black knot disease and were removed from the orchard. However, the cultivar Obilinaja (planted in the first row) has been relatively free of the disease.

- **Hops Trials**
  Dr. Abigail Maynard and Dr. David Hill Assisted by C. McCarthy, (Plot 57)
  There is a potential new market for local hop production in Connecticut to support the rapidly expanding local craft brewing industry. Hops are successfully grown in some Northeast states, but no data currently exists for Connecticut. Normally, hops are grown utilizing a high (20 ft) trellis system but that is a determent for many growers because it requires more specialized equipment. In this trial, which is repeated at the Valley Laboratory in Windsor, we are evaluating five disease-resistant hops cultivars when grown with the traditional high trellis system versus a low trellis system (10 ft.). At Windsor, low trellis systems will utilize existing tobacco shade tent structures. Plant vigor, cone yields, and disease and insect pest problems of the different cultivars grown utilizing the two trellis systems will be evaluated over the 3 years of this project.

- **Hops in New England**
  Dr. Katja Maurer, Dr. James A. LaMondia, and Dr. Abigail Maynard Assisted by M. Salvas and N. Child, (Plot 58)
  Hop (*Humulus lupulus*) cultivation has a long tradition on the Northeast coast of the United States. By the early 17th century, settlers brought this crop from Europe to New England. Due to the humid climate, hops were under high pressure from diseases and pests forcing production to shift to the Northwest coast in the late 19th century. However, recently hop production is on the rise again. The popularity of microbrew culture and local brewpubs as well as the growing demand for regional products has re-established interest in hop cultivation in New England. The female cones (flowers) provide beer with its characteristic bitter and aromatic flavor. Hops are very fast-growing plants with around 2 feet of weekly growth up to a stately size of 13 feet. CAES raises two small hop yards with several cultivars using high and low trellis systems to evaluate yields, growing characteristics, and susceptibility to diseases. The most common diseases and pests are downy mildew, caused by *Pseudoperonospora humuli*, aphids, and mites. The symptoms of downy mildew are stunted short shoots, called spikes, as well as chlorotic and curled down leaves. The general intension is to avoid chemical plant protection, therefore planting disease free plugs or resistant cultivars, sanitation, and removal of diseased plants help to control downy mildew. Nevertheless, at the moment it seems that hops are back in New England for good.

- **Management of Boxwood Blight, a New Disease of Boxwood and Pachysandra**
  Dr. James A. LaMondia and Dr. Katja Maurer Assisted by Michelle Salvas and Nathaniel Child, (Plot 55)
  Boxwood blight is a new, introduced disease in Connecticut. The disease is caused by the pathogenic fungus *Calonectria pseudonaviculata.* The impact of the disease has been staggering; boxwood plant losses have been estimated at $3 million in Connecticut in the first year after discovery. We conducted experiments to identify fungicides with activity and have determined the effects of these plant protection chemicals on conidial germination, leaf infection, and ability to suppress or kill different life stages of the pathogen. These fungicides are being applied alone and in combination at different time intervals to boxwood plants in pots in the greenhouse and at the CAES Valley Laboratory container nursery area to evaluate disease control. These data are being used to develop effective fungicide management programs with different and complementary combinations of active ingredients to prevent and manage disease while following recommendations to reduce the development of fungicide resistance

BUS TOUR (B)

EVERY HALF HOUR, 10:15 a.m. to 3:30 p.m.

EVERY HALF HOUR
10:15 a.m. – 3:30 p.m.

This is a great way to see the farm. Join us on an air conditioned bus ride around the farm for approximately 30 minutes. You can be dropped off at any plot, and picked up the next time the bus comes around. Dr. Neil Schultes and Mr. Michael Cavadini will narrate the ride.

BARN EXHIBITS (BARN B)

Nanotechnology- Applications and Implications
Department: Analytical Chemistry
Investigators: Dr. Roberto De La Torre Roche, Dr. Alia Servin, Dr. Arnab Mukherjee, Dr. Sanghamitra Majumdar, Dr. Luca Pagano, Mr. Craig Musante, Mr. Joseph Hawthorne and Dr. Jason C. White
Abstract: Nanomaterials (NM) have at least one dimension less than 100 nanometers (one billionth of a meter), and this tremendously small size results in unique physical and chemical properties not observed at the bulk scale. Nanotechnology is the field of research that takes advantage of these unique and useful nanoscale properties. Current nanomaterial use is ubiquitous; over 1600 NM-containing products are commercially available in areas such as electronics, health-care, cosmetics, agriculture, pharmaceuticals, and food processing. Human disease treatment is in the process of being revolutionized by nanotechnology. Of special concern to our laboratory is the use of nanomaterials in agriculture, including pesticide and fertilizer formulations. From a regulatory perspective, nanomaterials are considered to have the same risk and toxicity profile as the equivalent bulk material. However, recent research has suggested that this assumption may not be true. A lack of understanding regarding the fate and effects of nanomaterials in agricultural systems is troublesome given that food crop contamination could be a significant pathway of human exposure. Research within the Department is seeking to characterize the fate and effects of nanomaterials, with a specific focus on uncovering instances where behavior differs as a function of nanoscale size.

Forest Pest Outreach: What Bugs Our Woodlands
Department: Entomology
Investigators: Dr. Victoria Lynn Smith, Ms. Katherine Dugas
Assisted by: Mr. Zachary Brown
Abstract: The forests of Connecticut are under threat from invasive pests, including emerald ash borer, Asian longhorned beetle, and southern pine beetle. While we actively survey for some of these invaders, we depend upon the public to report unusual sightings in their trees. By increasing the number of people actively looking for and reporting occurrences of forest pests, we can help safeguard our valuable forest resources.

Understanding the Mosquito Microbiome for Practical Applications
Department: Environmental Sciences
Investigators: Dr. Douglas Brackney, Dr. Blaire Steven
Assisted by: Ariana Trease
Abstract: With the ability to transmit many human pathogens from West Nile virus to malaria parasites, mosquitoes are the deadliest animals to humans. Understanding the basic biology and ecology of mosquitoes will be paramount to effectively controlling these diseases. To this end, we have been investigating the interactions between mosquitoes and their resident bacteria (i.e. microbiota) in order to gain a better appreciation for their potential use in novel control strategies.

Adaptation Strategies of Trees Under Abiotic and Biotic Stresses
Department: Forestry and Horticulture
Investigators: Dr. Adriana L. Arango, Dr. Claire Rutledge, Dr. Blaire Steven
Assisted by: Mr. Joseph P. Barsky, Mr. Richard Cecarelli, Mr. Craig Musante, Ms. Jamie Cantoni, Ms. Amanda Massa, and Mr. Joe DeLucia
Abstract: Trees have proven to be historically extremely resilient to many constant biotic (herbivores and pathogens) and abiotic (drought, soil toxicity and pollution) pressures. However, climate change predictions suggest that there will be novel changes in the amplitude and variation of temperature and precipitation that will affect both forest and urban trees. Tree adaptation to novel conditions is therefore crucial for survival in cities where the urban heat island effect exacerbates temperature changes and where tree growth is restricted by soil compaction, limited root growth, and winter de-icing salts. Therefore, the objectives of our studies are to determine the adaptive mechanisms of oak, maples, white pine, and spruce water limitation (drought), tolerance of sugar maple to salt toxicity, and response mechanisms to insect infestations including emerald ash borer in ash and fringe trees, and southern pine beetle in red, scotch and pitch pines.

Research in Bacteria on Plants
Department: Plant Pathology and Ecology
Investigators: Dr. Lindsay Triplett and Dr. Quan Zeng
Assisted by: Ms. Regan Huntley and Ms. Michelle Hoang
Abstract: Bacteria cause many important diseases on crop and ornamental plants. This exhibit highlights CAES research on bacterial plant diseases, addressing questions of how bacteria survive on plants, how they suppress the plant immune system, and how they resist antibiotics.

Impacts of Variable Winters on Invasive Hemlock Woolly Adelgid Populations in Connecticut Forests
Department: Valley Laboratory
Investigator: Dr. Carole Cheah
Abstract: Winters can range widely in severity from year-to-year within the three climatic divisions in Connecticut. Hemlock woolly adelgid (HWA), an invasive, destructive insect on eastern hemlocks, has a generation that feeds and develops during fall, winter and spring. Studies for 15 years have shown that severe winters can drastically reduce HWA populations on Connecticut hemlocks with implications for subsequent control measures.

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: WWW.CT.GOV/CAES

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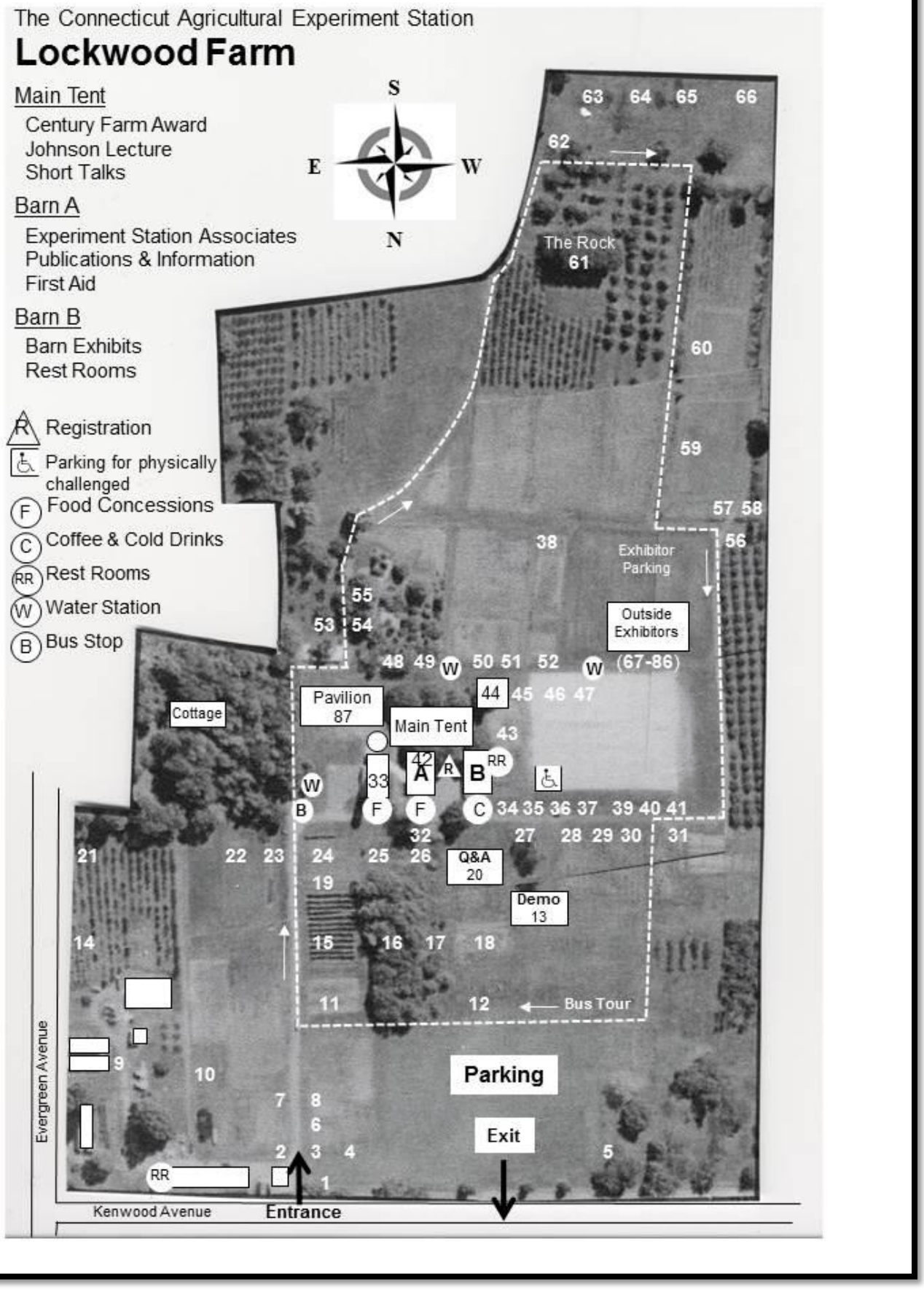
Putting Science to Work for Society since 1875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20
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13
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Entrance
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Kenwood Avenue
RR

FIELD PLOT LISTING

Outside Organizations (Plots 32, 33, 34, 67-86) are invited to participate

The plots at Lockwood Farm are planted and maintained by The Connecticut Agricultural Experiment Station's scientists and technical staff along with the help of Farm Manager Mr. Richard Cecarelli and his Research Technicians Mr. Rollin Hannan and Mr. Michael McHill as well as seasonal resource assistants Mr. Stan Olsson, Ms. Cheryl Remetz, and Mr. Matt Rose.

1. CHINESE CHESTNUT TREES
2. SWEET POTATO TRIALS
3. SHEET COMPOSTING WITH OAK AND MAPLE LEAVES
4. CURIOSITY GARDEN
5. NUT ORCHARD
6. SWEET CORN TRIALS
7. OKRA TRIALS
8. KABOCHA SQUASH TRIALS
9. GREENHOUSE PRODUCTION OF FIGS IN SELF-WATERING PLANTERS
10. USE OF EARTHWORMS AND BIOCHAR TO SUPRESS FUSARIUM CROWN ROT OF ASPARAGUS
11. COMMERCIAL CHESTNUT CULTIVARS
12. REMOTE ACCESS WEATHER STATION
13. TECHNICAL DEMONSTRATION TENT
14. ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON LANDSCAPE PLANTS
15. COMMERCIAL CHESTNUT SEEDLINGS
16. CONTROL OF BLIGHT ON AMERICAN CHESTNUTS
17. NEW HYBRID CHESTNUT ORCHARD
18. USE OF NANOPARTICLES OF METAL OXIDES TO SUPRESS SOIL BORNE DISEASES OF EGGPLANTS AND WATERMELONS
19. COMPARISON OF GRAFT UNION HEIGHT ON CHARDONNAY GRAPEVINES
20. QUESTION AND ANSWER TENT
21. POWDERY MILDEW ON CHARDONNAY WINE GRAPES
22. GROWTH AND CONTROL OF NON-NATIVE BAMBOOS
23. FIGS IN SELF-WATERING PLANTERS
24. TABLE GRAPE DEMONSTRATION PLOT
25. SEEDLINGS OF OLD SURVIVING AMERICAN CHESTNUTS
26. WILD CHESTNUTS FROM TURKEY
27. INVASIVE INSECTS IN THE NORTHEAST
28. EMERALD ASH BORER RESEARCH UPDATE
29. ASSESSING NEONICOTINOID LEVELS IN NURSERY PLANTS

30. PREDOMINANT MOLDS ON WATER-DAMAGED DRYWALL
31. COMPOSTING LEAVES USING THE STATIC PILE METHOD
32. HAMDEN POLICE DEPARTMENT
33. VERIZON WIRELESS
34. THE FARMER'S COW
35. KIDS' KORNER
36. SELF-GUIDED ACTIVITY FOR ALL CHILDREN, INCLUDING GIRL SCOUTS
37. HANDS-ON CHEMISTRY
38. ISOLATED BACTERIAL ENDOPHYTES ENHANCE PLANT GROWTH AND PROMOTE DDE DEGRADATION
39. CAES AND THE FDA FOOD EMERGENCY RESPONSE NETWORK (FERN)
40. NANOMATERIALS IN AGRICULTURE: TROPHIC TRANSFER AND POTENTIAL FOOD CHAIN CONTAMINATION
41. INVASIVE AQUATIC PLANT PROGRAM
42. EXPERIMENT STATION ASSOCIATES
43. FIDDLEHEAD TRIALS
44. THE PUBLIC HEALTH AND ENTOMOLOGY TENT
    a. MOSQUITO SURVEILLANCE FOR WEST NILE AND EASTERN EQUINE ENCEPHALITIS VIRUSES
    b. THE "DEER" TICK IXODES SCAPULARIS
    c. INTEGRATED TICK MANAGEMENT
    d. TICK TESTING PROGRAM FOR LYME AND ALLIED DISEASES
45. SUDDEN VEGETATION DIEBACK OF CONNECTICUT SALT MARSHES
46. INTEGRATING FOREST AND ROADSIDE MANAGEMENT OBJECTIVES TO CREATE STORM RESILIANT FORESTS
47. AN EXPERIMENTAL DEER REPELLENT TRIAL FOR THE HOMEOWNER'S BACKYARD VEGETABLE GARDEN
48. NATIVE WOODY SHRUBS
49. BIRD AND BUTTERFLY GARDEN
50. ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON VEGETABLE PLANTS
51. HOW DOES BIOCHAR ADDED TO SOIL REDUCE EMISSSIONS OF THE POTENT GREENHOUSE GAS, NITROUS OXIDE?
52. POLLINATION OF SQUASH AND PUMPKINS
53. CHESTNUT SPECIES AND HYBRIDS
54. HEALTHY PLANTS-HEALTHY BUSINESS: SUPPORT OF THE GREEN INDUSTRY BY INSPECTION
55. MANAGEMENT OF BOXWOOD BLIGHT, A NEW DISEASE OF BOXWOOD AND PACHYSANDRA
56. ENVIRONMENTALLY-FRIENDLY CONTROL OF FIRE BLIGHT ON APPLES
57. HOPS TRIALS
58. HOPS IN NEW ENGLAND
59. HYBRID AND VINIFERA WINEGRAPE CULTIVAR TRIAL
60. PINO GRIS CULTURAL TRIALS
61. THE ROCK
62. ASIAN CHESTNUT GALL WASP ON CHESTNUT

63. BEACH PLUM TRIALS
64. PAWPAW TRIALS
65. JAPANESE PLUM VARIETY TRIALS
66. HYBRID ELM TREES
67. CONNECTICUT BOTANICAL SOCIETY
68. CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION DIVISION OF FORESTRY (CT DEEP DIVISION OF FORESTRY)
69. CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONEMTNAL PROTECTION DIVISION OF WILDLIFE (CT DEEP DIVISON OF WILDLIFE)
70. CONNECTICUT DEPARTMENT OF LABOR CONN-OSHA (CONN OSHA)
71. CONNECTICUT ENVIRONMENTAL COUNCIL (CTEC)
72. CONNECTICUT FARM BUREAU ASSOCIATION (CFBA)
73. CONNECTICUT GREENHOUSE GROWERS ASSOCIATION (CGGA)
74. CONNECTICUT INVASIVE PLANT WORKING GROUP (CIPWG)
75. CONNECTICUT NORTHEAST ORGANIC FARMING ASSOCIATION (CT NOFA)
76. CONNECTICUT TREE PROTECTIVE ASSOCIATION (CTPA)
77. FEDERATED GARDEN CLUBS OF CT, INC
78. HAMDEN LAND CONSERVATION TRUST
79. LYMAN HALL HIGH SCHOOL AGRICULTURAL SCIENCE AND TECHNOLOGY PROGRAM
80. UNIVERSITY OF CONNECTICUT MASTER GARDENER PROGRAM (UCONN-EXTENSION-MASTER GARDENER PROGRAM)
81. UNITED STATES DEPARTMENT OF LABOR/OSHA (US OSHA)
82. UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE (USDA APHIS/PPQ)
83. UNITED STATES DEPARTMENT OF AGRICULTURE FARM SERVICE AGENCY (USDA FSA)
84. UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURAL STATISTICS SERVICE, NEW ENGLAND (USDA NASS)
85. UNITED STATE DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE (USDA NRCS)
86. WORKING LANDS ALLIANCE
87. PAVILION AT LOCKWOOD FARM

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

FIELD PLOT ABSTRACTS

1. CHINESE CHESTNUT TREES
Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten
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. SWEET POTATO TRIALS
Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy
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.

3. SHEET COMPOSTING WITH OAK AND MAPLE LEAVES
Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy
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 1995-2013 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. Yields from plots amended with oak leaves were compared to plots amended with maple leaves and the unamended controls. In 2014, the greatest eggplant yields were from plots amended with oak leaves (12.4 lbs./plant) followed by plots amended with maple leaves (9.7 lbs./plant) and the unamended control plots (7.6 lbs./plant). Lettuce yields from the plots amended with maple and oak leaves were slightly greater (0.8 lbs./head) than yields from the unamended control (0.7 lbs./head). The greatest onion yields were from plots amended with oak leaves (5.4 lbs./plot) compared to the unamended control (3.7 lbs./plot) and plots amended with maple leaves (2.4 lbs./plot).

4. CURIOSITY GARDEN
Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy
This demonstration plot contains a potpourri of vegetables grown to pique the interest of home gardeners and growers of specialty crops. Included are globe artichokes, grown specifically for annual culture from seed. Cardoon, a lesser-known relative of artichokes, is also being grown for the first time at the Station. It is considered a delicacy in Mediterranean cuisine. It tastes like artichoke but the stem is eaten (which is blanched) not the flower buds. Also being grown for the first time are kalettes. This is a crop that was developed through traditional breeding methods by crossing kale and Brussels sprouts. Grown and harvested similarly to Brussels sprouts, the florets are open rosettes resembling flowers, grown on stalks of tall, upright plants. Kale and Brussels sprouts are also included for comparison. Two cultivars of edamame or edible soybean are being grown in this garden which will add to our knowledge of this crop which is growing in popularity.

5. NUT ORCHARD
Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten
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.

6. SWEET CORN TRIALS
Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

Among all vegetables grown in Connecticut, sweet corn ranks first in acres grown and cash value with over half of all vegetable farms including sweet corn as a crop. Supersweet corn trials were conducted from 1995 to 1998 at CAES. Of the 22 cultivars evaluated, only 5 remain for sale. Trials including new varieties developed in the last 15 years would provide important information to the over 300 Connecticut farms who grow sweet corn. This 3-year trial, which is also repeated at the Valley Laboratory in Windsor, is evaluating the yield and quality of five cultivars of sweet corn planted May 1 and June 1. In addition, cool soil percent germination will be determined from the early (May 1) planting. Last year, Temptation had the highest germination (92%) at Windsor for the May 1 planting while Xtra Tender (75%) was the highest at Lockwood Farm. Espresso (129 ears/20 ft.) had the greatest yields when averaging both plantings at both sites followed by Quickie (102 ears/20 ft.).

7. OKRA TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

Okra is grown for its long pointed seed pods, which are used in gumbos and soups. It is best picked when the pods are young and immature or about 2-4 inches long. It is considered a delicacy in the southern United States particularly when breaded with corn meal and deep fried. It is in the same family as cotton, hollyhocks, and hibiscus which make it a nice ornamental plant as well. Okra plants are extremely drought resistant which make a popular vegetable in countries with difficult growing conditions. It grows best in hot weather with warm soils so that yields are usually increased when grown with black plastic mulch in the Northeast. In this trial, we are growing 10 cultivars of okra to determine which performs best in Connecticut's climate and soils. In addition, we are growing the crop with and without black plastic mulch to determine whether the expected increased yields utilizing the black plastic mulch is enough to offset the added expense of the plastic. This experiment is also duplicated at our Valley Laboratory in Windsor.

8. KABOCHA SQUASH TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

Kabocha is a generic term for squash in Japan, but in North America, kabocha is a specific type of winter squash. It has a hard, dull, bumpy dark green shell marked with pale, celery green striations. Round with a flattened top, it ranges from one to eight pounds, but generally averages two to three pounds. It has a brilliant yellow-orange flesh with a naturally sweet flavor and texture similar to pumpkin and sweet potato. When kabocha is harvested, it is immature with dry, bland-tasting, pale yellow flesh. In order to enhance sweetness and maturity with a bright orange color, it must be ripened to full maturity. It reaches the peak of ripeness about 6-12 weeks after it is harvested. Two cultivars of kabocha were included in our winter squash trials in 1997-1998 but there are now over 20 cultivars on the market including both regular and new smaller (1 lb.) personal-sized types. This 3-year trial, which is also repeated at the Valley Laboratory in Windsor, is evaluating the yield and quality of eleven cultivars of kabocha squash. Included in the trials are 8 short-vined and 3 long-vined varieties as well as 3 personal-sized varieties.

9. GREENHOUSE PRODUCTION OF FIGS IN SELF-WATERING PLANTERS

Dr. Charles R. Vossbrinck *Assisted by* Richard Cecarelli and Mario DiNatale

Figs are a semi-tropical fruit, and are difficult to grow in Connecticut. They will not withstand the winters here, but will often come back from the roots. However, such growth does not produce mature fruit. Three basic strategies exist for over-wintering fig trees in our region: wrapping the tree, wrapping and burying the tree, and growing the trees in pots and bringing them into a protected area for the winter. As an alternative, we are testing 6 varieties of fig trees planted in 25 gallon self-watering pots in a plastic greenhouse and measuring the yield of fruit. The trees are kept at temperatures between 20°F and 50°F from December 1 to March 31 (the dormant season) and between 50°F and 100°F between April 1 and November 30, (the growing season).

10. USE OF EARTHWORMS AND BIOCHAR TO SUPPRESS FUSARIUM CROWN ROT OF ASPARAGUS

Dr. Wade Elmer *Assisted by* Peter Thiel

Greenhouse trials have shown that when earthworms were added to pots filled with soil infested with Fusarium pathogens; asparagus plants had less disease and were larger than the pots not amended with earthworms. Biochar, a fine ground charcoal product that has a high absorptive capacity, has also been shown to suppress the asparagus disease in the greenhouse. These plots were designed to study the role of earthworms and biochar alone and in combination to determine their effect on asparagus under field conditions. The 2011-2015 harvest suggest augmenting field's plots with earthworms plus mulch provided the greatest increase in yields when compared to untreated plots. Biochar alone was not effective in increasing yields.

11. COMMERCIAL CHESTNUT CULTIVARS

Dr. Sandra L. Anagnostakis *Assisted by* P. Sletten

These grafted 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. 'Eaton', in front, is a Chinese x (Japanese x American) cultivar released by CAES. The other trees are cultivar 'Bouche de Betizac', planted last year. We are evaluating the potential of these commercial chestnut cultivars for nut production here in Connecticut.

12. REMOTE ACCESS WEATHER STATION

Dr. Francis J. Ferrandino *Assisted by* 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.

13. TECHNICAL DEMONSRATION TENT

See program pages 9-10 for a schedule of technical demonstrations.

14. ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON LANDSCAPE PLANTS

Dr. Francis J. Ferrandino *Assisted by* 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.

15. COMMERCIAL CHESTNUT SEEDLINGS

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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 grafted cultivars in plot #11.

16. CONTROL OF BLIGHT ON AMERICAN CHESTNUTS

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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.

17. NEW HYBRID CHESTNUT ORCHARD

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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.

18. USE OF NANOPARTICLES OF METAL OXIDES TO SUPPRESS SOIL BORNE DISEASES OF EGGPLANTS AND WATERMELONS

Dr. Wade Elmer and Jason White *Assisted by* Peter Thiel

When metallic oxides of copper (Cu), manganese (Mn), and silicon (Si), titanium (Ti), and zinc (Zn) are manufactured at the nanoscale (<0.000,001 mm) they are called nanoparticles (NP). The particles have unique chemical and physical properties not observed in equivalent bulk materials. The role of NP in plant disease management is relatively unknown. These plots will demonstrate the potential for NP of metallic oxides to suppress root diseases or eggplants and watermelon to enhance crop productivity. Treatments will be compared to standard bulk forms of each metal to see if the NP has superior effects.

19. COMPARISON OF GRAFT UNION HEIGHT ON CHARDONNAY GRAPEVINES

Dr. Francis J. Ferrandino *Assisted by* Joan Bravo and Robert Snow

The coldest layer of air during a radiation freeze is immediately above the soil or snow level. By elevating the graft union, the labor and expense of burying the graft union might be avoided. Chardonnay vines, Dijon clone 95 on C3309 rootstock, were transplanted to the vineyard in spring, 2007. Half are of standard grafting height and half have the graft union 26 inches above ground. Dataloggers are placed at each graft union height. Comparisons for yield, fruit quality, and winter damage began in 2009 and will continue

through 2014. High grafted vines had significantly higher yields than low grafted vines in 2009-2012. However, yields were the same in 2013.

20. QUESTION AND ANSWER TENT
Dr. Yonghao Li, Ms. Rose Hiskes, Dr. Gale E. Ridge, Mr. Robert Durgy, Ms. Diane Riddle, and Ms. Lindsay Patrick
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.

21. POWDERY MILDEW ON CHARDONNAY WINE GRAPES
Dr. Francis J. Ferrandino *Assisted by* 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.

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

23. FIGS IN SELF-WATERING PLANTERS
Dr. Charles R. Vossbrinck *Assisted by* Richard Cecarelli and Mario DiNatale
Figs are a semi-tropical fruit, and are difficult to grow in Connecticut. They will not withstand the winters here, but will often come back from the roots. However, such growth does not produce mature fruit. Three basic strategies exist for over-wintering fig trees in our region: wrapping the tree, wrapping and burying the tree, and growing the trees in pots and bringing them into a protected area for the winter. As an alternative, we are testing 6 varieties of fig trees planted in 25 gallon self-watering pots in a plastic greenhouse and measuring the yield of fruit. The trees are kept at temperatures between 20°F and 50°F from December 1 to March 31 (the dormant season) and between 50°F and 100°F between April 1 and November 30, (the growing season).

24. TABLE GRAPE DEMONSTRATION PLOT
Dr. Francis J. Ferrandino *Assisted by* Joan Bravo and Ross Levin
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.

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

26. WILD CHESTNUTS FROM TURKEY
Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten
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.

27. INVASIVE INSECTS IN THE NORTHEAST

Dr. Chris T. Maier *Assisted by* Tracy Zarrillo and Morgan Lowry

Invasive insects pose a significant threat to the economy and the biodiversity of our region. Annually, state and federal workers conduct surveys to detect new non-native insects and to determine the distributional range of established ones. Early detection, in particular, greatly decreases the cost of coping with invasive insects. The cost of foreign insects can be reduced even further by conducting research on their behavior and ecology to develop effective strategies to slow their spread or to eradicate them. During the last few years, we have examined the distribution and biology of the brown marmorated stink bug, the lily leaf beetle, the Eurasian spruce needleminer, the barberry fly, and several non-native bees. Recently, we began to evaluate the impact of the lily leaf beetle upon native lilies and closely related plants.

28. EMERALD ASH BORER RESEARCH UPDATE

Dr. Claire Rutledge *Assisted by* Mioara Scott, and Alexandra Kahn

The emerald ash borer (EAB) is an invasive beetle from Asia that attacks and kills native ash trees. Since its first detection in Michigan in 2002 the beetle has spread across eastern North America. The station detected EAB in 2012 in Prospect Connecticut. Find out about the current distribution, and impact of EAB, and also about efforts that are underway to help manage this harmful pest. Highlighted will be EAB detection by citizen-scientists, the Wasp-Watchers who use a native wasp to detect and monitor EAB levels, and biological control of EAB in Connecticut.

29. ASSESSING NEONICOTINOID LEVELS IN NURSERY PLANTS

Dr. Richard S. Cowles, Dr. Kimberly Stoner, and Dr. Brian Eitzer *Assisted by* I. K. Mensah

Connecticut nurseries have been highly dependent on imidacloprid, a neonicotinoid insecticide, to protect rhododendron crops from injury caused by an endemic leafminer. This leafminer, *Lyonetia latistrigella*, has many alternate hosts in the plant family Ericaceae, and will cause unsightly mines in leaves. More importantly, this leaf miner is not found in many states, and so nursery plants must be free of this pest at the time of shipping. The safety to bees of ornamental plants treated with neonicotinoid insecticides can be determined if the concentration of these insecticides in nectar or pollen is known, and is found to be below a level of concern to pollinators. We devised methods to collect nectar and pollen so that sufficient quantities (1 gram samples of either nectar or pollen) would be available for determining residue levels using HPLC/MS/MS. Two methods worked well to collect pollen, a vacuum air sampler with a fine filter captured pollen liberated from anthers, and vortexing of anthers and partial stamens also was efficient. Nectar was most efficiently collected by watering the plants well, and then enclosing them in a plastic bag overnight. Nectar droplets could then be pipetted from each flower.

30. PREDOMINANT MOLDS ON WATER-DAMAGED DRYWALL

Dr. De-Wei Li

Many fungi can be isolated from dry wall building materials that have been affected by water damage or extended high humidity (such as occurred in Superstorm Sandy or from roof leaks etc.). The fungal compositions and infestation areas on dry wall are positively related with the levels and durations of water damage. The predominant fungi observed are *Stachybotrys chartarum*, *Ulocladium* spp., *Chaetomium globosum*, *Spegazzinia tessarthra*, *Curvularia* spp. and *Phoma* sp. on dry wall with long term water damage. The author will be available to discuss sampling and identification of indoor molds as well as remediation of damage.

31. COMPOSTING LEAVES USING THE STATIC PILE METHOD

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

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^{o}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.

32. 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.hamden.com/content/219/228/default.aspx

33. VERIZON WIRELESS

Learn about the cellular transmission tower.

34. THE FARMER'S COW

Kathy Smith

The Farmer's Cow is an innovative, premium milk brand produced and marketed by Connecticut family-owned dairy farms. The Farmer's Cow was formed in response to consumers' interest in purchasing fresh, naturally produced, local products. Collectively, The Farmer's Cow member farms milk 2,300 cows and manage over 6,000 acres of Connecticut farmland. The Farmer's Cow milk is currently available in over 100 grocery stores throughout the state. A complete listing of retailers is shown at www.thefarmerscow.com. The Farmer's Cow is sold in half gallon cartons in whole, 2 percent, 1 percent, and skim varieties. Chocolate milk and single-serve packaging are under development. The owners of The Farmer's Cow are active members in The Connecticut Farmland Trust and The Working Lands Alliance who are working to protect and preserve Connecticut farmland. They were also the founding members of "Very Alive," a non-profit organization dedicated to the promotion of Connecticut Agriculture. Connecticut farms contribute $2 billion annually to the local economy. 51 percent of Connecticut farmland is in dairy or dairy support. In 2003, there were 191 dairy farms remaining in Connecticut. The Farmer's Cow owners are: Paul and Diane Miller, Fairvue Farms, Woodstock; Bill, Tom and Greg Peracchio, Hytone Farm, Coventry; Ned and Renee Ellis, Mapleleaf Farm, Hebron; Jim and Don Smith, and Nate Cushman, Cushman Farms, Franklin; Peter Orr and Family, Fort Hill Farms, Thompson; Robin and Lincoln Chesmer, Graywall Farms, Lebanon. Further information can be found at www.thefarmerscow.com, www.ctfarmland.org, and www.workinglandsalliance.org.

35. KIDS' KORNER

Kathryn Soleski, Lisa Kaczenski Corsaro, and Tracy Zarrillo

Come to the Kids' Korner to pick up your child's passport and a goody bag. 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 36) to collect a CAES patch.

36. SELF-GUIDED ACTIVITY FOR ALL CHILDREN, INCLUDING GIRL SCOUTS

Terri Arsenault

Children can come to this plot to complete an age appropriate, self-guided activity, to earn a patch of their choosing among the 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.

37. HANDS-ON CHEMISTRY

Dr. Christina Robb, Ms. Kitty Prapayotin-Riveros, Dr. Walter Krol, Ms. Terri Arsenault, Mr. Michael Cavadini, 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.

38. ISOLATED BACTERIAL ENDOPHYTES ENHANCE PLANT GROWTH AND PROMOTE DDE DEGRADATION

Dr. Jason C. White and Ms. Nele Eevers (Hasselt University, Hasselt, Belgium), *Assisted* by Joseph Hawthorne

Previous work had shown that zucchini possesses a unique ability to accumulate weathered persistent organic pollutant such as DDE (metabolite of DDT) from soil. In a collaborative project with Hasselt University in Belgium, several endophytic bacteria were isolated from zucchini. The isolated organisms were shown to be able to degrade DDE in solution, potentially using the pollutant as an energy source. In this field trial, the isolated organisms were inoculated back into the root zone of the zucchini seedlings at planting to test for plant growth promoting ability and DDE degrading capacity under field conditions.

39. CAES AND THE FDA FOOD EMERGENCY RESPONSE NETWORK (FERN)

Dr. Brian Eitzer, Dr. Walter Krol, Dr. Christina Robb, Dr. Arnab Mukherjee, Dr. Sanghamitra Majumdar, Ms. Terri Arsenault, Mr. Joseph Hawthorne, Mr. Craig Musante, Mr. Michael Cavadini, and Dr. Jason C. White

The CAES Department of Analytical Chemistry has been a funded member of the US FDA Food Emergency Response Network (FERN) since 2005. The FERN was established in 2005 in the recognition that the food supply could be a target of terrorism. The FERN consists of state laboratories that receive funding and equipment from the FDA and can be activated to assist as needed on national issues of concern related to the food supply. The Department of Analytical Chemistry has been activated to test food for melamine contamination, in response to the 2010 Deepwater Horizon Oil Spill, to test food from the 2012 National Democratic and Republican National Conventions, and to assist in testing juice and other foods for arsenic content. The FDA has also asked the Department to validate new methods and instrument platforms to increase the accuracy and efficiency of national food safety surveillance programs. Last, two Department members are currently working with the FDA as instructors for technical courses offered to other state and federal laboratory staff around the country.

40. NANOMATERIALS IN AGRICULTURE: TROPHIC TRANSFER AND POTENTIAL FOOD CHAIN CONTAMINATION

Dr. Roberto De la Torre-Roche, Mr. Joseph Hawthorne, Dr. Alia Servin, Dr. Luca Pagano (University of Parma, Italy), Mr. Craig Musante, and Dr. Jason C. White

Nanomaterials (NM) have at least one dimension less than 100 nanometers (one billionth of a meter) and this small size results in unique and useful properties. For example, at that size range, materials that are normally good insulators actually become conductive (silicon) and other elements that are generally stable actually become chemically reactive (gold). Current nanomaterial use is ubiquitous; over 1600-NM containing products are commercially available in areas such as electronics, health-care, cosmetics, pharmaceuticals, agriculture, and food processing/packaging. One area of research being funded by a USDA Food Safety grant is seeking to characterize the potential trophic transfer of engineered nanomaterials within food chains. The NM are added to soil, following by the subsequent planting of crops. After one month, the plant tissues are analyzed for NM content but some leaves are used as food for herbivores such as crickets. Similarly, after cricket exposure, some insects are analyzed for NM content but others are used as food for wolf spiders or mantids. Results indicate that particle size specific accumulation and trophic transfer occurs for some but not all nanomaterials. Mechanistic studies are seeking to explain these findings.

41. INVASIVE AQUATIC PLANT PROGRAM

Mr. Gregory Bugbee and Ms. Jennifer Fanzutti *Assisted by Summer Stebbins and Jesse Schocz*

Connecticut lakes and ponds are becoming increasing 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 and reduce property values. Researchers in the Department of Environmental Sciences are documenting our State's invasive aquatic plant problem. From 2004 - 2014, we surveyed and mapped the invasive and native plants in over 200 Connecticut lakes and ponds. 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.

42. EXPERIMENT STATION ASSOCIATES

Mr. Will Rowlands

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.

43. FIDDLEHEAD TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

Fiddleheads are the furled fronds of a young fern, harvested in spring for use as a vegetable. Ultimately, each fiddlehead would unroll into a mature frond. The most popular fiddlehead is that of the ostrich fern (*Metteuccia struthiopteris)*, often called the fiddlehead fern. The ferns are available commercially either canned of frozen, but since the early 1980's, farmers' markets and supermarket chains have sold fresh ferns in season. Its flavor is similar to asparagus with a pleasantly crunchy, tender-firm texture. In this experiment, data will be collected on the growth and vigor of these newly planted ferns grown under different cultural conditions. Once established, experiments will then be conducted to determine the number of fiddleheads that can be harvested from each clump to optimize both the yield of fiddleheads and growth and health of the fern plant.

44. THE PUBLIC HEALTH AND ENTOMOLOGY TENT

a. MOSQUITO SURVEILLANCE FOR WEST NILE AND EASTERN EQUINE ENCEPHALITIS VIRUSES

Dr. Philip Armstrong and Dr. Theodore Andreadis *Assisted by* Michael Misencik, John Shepard, Michael Thomas, Stephanie Canales, Molly Clark, Daniel Cole, Alexander Diaz, Ryan Gregory, Joseph Medwid, Katherine Nazario, Michael Olson, Tanya Petruff, Angie Marie Rivera

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 of protecting the public and reducing the risk of human disease. Experiment Station scientists and technicians monitor mosquitoes, eastern equine encephalitis (EEE) and West Nile virus activity at 91 locations throughout Connecticut from June-October. This information is used to assess environmental risk of human infection and guide mosquito control and other disease prevention efforts as needed. To date, the program has collected and tested nearly 3 million mosquitoes representing 52 different species since 1997. A total of 1,581 West Nile virus isolations have been

recovered from 21 different mosquito species and a total of 399 isolations of EEE virus isolations have come from 19 species of mosquitoes. West Nile virus 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 Harford metropolitan area. Seasonal transmission of EEE virus 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.

b. THE "DEER" TICK *IXODES SCAPULARIS*

Dr. Kirby C. Stafford III *Assisted by* Heidi Stuber

The blacklegged tick or "deer" tick *Ixodes scapularis* transmits the agents of Lyme disease, babesiosis, anaplasmosis, and a new relapsing fever *Borrelia* in Connecticut. Observe live and preserved ticks under the microscope. The latest information on natural and biological control are available.

c. INTEGRATED TICK MANAGEMENT

Dr. Kirby C. Stafford III, Dr. Scott C. Williams, and Dr. Goudarz Molaei *Assisted by* Michael Short, Heidi Stuber, Sarah McQuade, Adam Misiorski, Megan Floyd, Kelsey Schwenk, and Pronoma Srivastava.

An integrated tick management project in Redding, CT, funded by the Centers for Disease Control and Prevention (CDC) is now in its third year. This project focused on examining how a combination of biopesticides (entomopathogenic fungus *Metarhizium anisopliae*, Met52), fipronil-based rodent bait boxes, and deer population management can reduce the risk of Lyme disease in select neighborhoods. The combination of the Met52 and bait boxes has resulted in an average 78.4% reduction in tick abundance for the first two years of the project.

d. TICK TESTING PROGRAM FOR LYME AND ALLIED DISEASES

Dr. Goudarz Molaei *Assisted by* Saryn Kunajukr, Shannon Savisky, and Pronoma Srivastava

Tick-associated illnesses, including Lyme disease (LD), pose a major threat to human health in Connecticut. LD is the most prevalent arthropod-associated disease in the U.S., with an estimate of 300,000 cases per year. In 2013, Connecticut had the 5th highest number of confirmed cases of LD and 4th highest incidence rate of 58.7 per 100,000 persons in the U.S. The blacklegged tick, *Ixodes scapularis*, is the most important species in transmitting *Borrelia burgdorferi*, *Babesia microti*, and *Anaplasma phagocytophillum*, the causative agents of LD, babesiosis, and anaplasmosis, respectively. The Tick Testing Program at The Connecticut Agricultural Experiment Station was established in 1990 as a service to local health departments and districts in order to assist physicians and Connecticut residents concerning treatment. Each year, an average of 3,000 ticks are submitted for testing. In the past, testing was limited to the LD agent, but in view of increasing human cases of tick-related illnesses in the state, testing has been expanded to include these two additional tick-associated pathogens, which represents a significant enhancement of the CAES tick testing services.

45. SUDDEN VEGETATION DIEBACK OF CONNECTICUT SALT MARSHES

Dr. Wade Elmer *Assisted by* Peter Thiel

Salt marshes are the most productive ecosystems in Connecticut. Around 2000, large irregular, barren areas appeared along the intertidal creeks from New Haven to New London. This phenomenon was Sudden Vegetation Dieback (SVD) and affects mostly smooth cord grass (*Spartina alterniflora*). A key feature of SVD is that the plants do not grow back the next year. We are studying the role of newly discovered pathogenic fungal species and the role of herbivorous nocturnal marsh crabs on recovery from SVD.

46. INTEGRATING FOREST AND ROADSIDE MANAGEMENT OBJECTIVES TO CREATE STORM RESILIENT FORESTS

Dr. Jeffrey S. Ward *Assisted by* Joseph P. Barsky and Amanda Massa

Residents throughout the region have been affected by recent storms that negatively impacted both utility and transportation infrastructures through prolonged outages and impassable roads. Hanging, fallen, and/or broken trees have contributed to many outages. We have begun a collaborative project of managing roadside forests to increase utility reliability while maintaining their aesthetic appeal by integrating silvicultural and arboricultural practices. Collaborators on this project include: Audubon Connecticut, University of Connecticut, Connecticut Light and Power, Connecticut Department of Energy and Environmental Protection, and several forest landowners.

47. AN EXPERIMENTAL DEER REPELLENT TRIAL FOR THE HOMEOWNER'S BACKYARD VEGETABLE GARDEN

Dr. Scott C. Williams *Assisted by* Michael R. Short and Megan A. Floyd

Chronically overabundant white-tailed deer are the source of both headache and heartbreak for many Connecticut agricultural professionals and backyard gardeners. Without physical exclusion, planting browse-resistant plant species and the use of effective deer repellents are essential for Connecticut gardeners. However, because most commercial deer repellents formulations contain

allergens and both foul-smelling and -tasting ingredients, they are not labeled for use on produce meant to be consumed by humans. Working collaboratively with staff from Bobbex, Inc. of Monroe, CT, we are investigating the effectiveness of an experimental deer repellent formulation that does not contain allergens and could potentially be used to protect produce grown in backyard gardens from deer and possibly other mammalian pests such as rabbits, woodchucks, and small rodents. We have two experimental gardens on private lands in Redding and Guilford where we are testing the formulation's effectiveness as compared to plants that are fenced to those with no protection. Results should be forthcoming at the end of the growing season.

48. NATIVE WOODY SHRUBS

Dr. Jeffrey S. Ward *Assisted by* Joseph P. Barsky and Jamie Cantoni

Native woody shrubs offer an alternative to exotics commonly used in landscaping. This collection of shrubs was assembled in 1962 and in 1976 it was arranged in its present form with a dry site on the gravel mound and moist site in the shallow, plastic-lined depression. Many of these shrubs flower in the spring; their flowers can be seen in the photographs. Others, such as sweet pepperbush, spirea, and buttonbush, flower in summer. Witch-hazel flower in early autumn. Birds are frequent visitors to the garden and quickly eat the mature fruit. These shrubs survive with minimal maintenance. Occasional mowing, annual removal of dead stems, and replenishment of mulch are performed. These shrubs have never been fertilized, watered, or treated for disease.

49. BIRD AND BUTTERFLY GARDEN

Ms. Jane Canepa-Morrison and Mr. Jeffrey Fengler

The Bird and 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 you 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.

50. ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON VEGETABLE PLANTS

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

Many vegetable plants commonly used in Connecticut gardens 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 vegetables (tomato, pepper, eggplant, Pumpkin, and muskmelon) 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.

51. HOW DOES BIOCHAR ADDED TO SOIL REDUCE EMISSIONS OF THE POTENT GREENHOUSE GAS, NITROUS OXIDE?

Dr. Joseph J. Pignatello and Dr. Feng Xiao

Biochar is a charcoal-like product of biomass waste materials, such as forest litter and crop residue. It is made by heating the wastes at high temperature in the absence of air. Biochar has attracted interest as a soil amendment in agriculture due to its reported positive effects on soil fertility. An unexpected benefit of biochar addition to soil is a reduction in the release of nitrous oxide (N_2O), the third most important greenhouse gas after carbon dioxide and methane. Nitrous oxide is produced by bacteria during the natural cycling of nitrogen, but currently about 30-44% of global emissions originate from the use of manure and nitrogen fertilizers. At the present time, the underlying causes of nitrous oxide suppression in soil by biochar are unknown, and it is not clear how long-lasting the effects will prove to be. Most research to date is based on the assumption that biochar works indirectly by affecting the numbers and/or activities of key bacteria involved in the nitrogen cycle. However, we have found that biochar itself binds nitrous oxide molecules strongly, and to some degree irreversibly, within its pores. Strong binding could explain emission suppression, at least over the short term. We have sought to characterize the key physical and chemical properties of biochar responsible for its ability to adsorb nitrous oxide by varying the feedstock and heating conditions used to make the biochar.

52. POLLINATION OF SQUASH AND PUMPKINS

Dr. Kimberly A. Stoner *Assisted by* Tracy Zarrillo, Morgan Lowry, B. Gluck, A. Kieley, K. Niland, and A. Peterson

Squashes pumpkins, and most other cucurbits require insect pollination in order to set fruit. These crops have separate male and female flowers, and many insect visits are required in order to deposit enough pollen for fruiting. In Connecticut, nearly all the pollination of pumpkins and squash is carried out by three species of bees: honey bees (*Apis mellifera*), bumble bees (*Bombus impatiens*), and squash bees (*Peponapis pruinosa*). Over the last four years, we have worked with growers of pumpkins and winter squash across the state, measuring various factors that could potentially influence the numbers and species of bees pollinating the crop. In addition to counting the numbers of bees on 100 flowers, we have made video recordings of bees visiting the female flowers,

measured pollen deposition on the flowers, and measured fruit set. We have also measured pesticides in pumpkin and squash nectar and pollen and in bees collected from the crop and analyzed bees of all three species for viruses and fungi that could cause disease.

53. CHESTNUT SPECIES AND HYBRIDS

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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 #16). 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.

54. HEALTHY PLANTS—HEALTHY BUSINESS: SUPPORT OF THE GREEN INDUSTRY BY INSPECTION

Dr. Victoria Lynn Smith *Assisted by* Tia Blevins, Mark Creighton, Stephen Sandrey, and Peter Trenchard

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 2014, the Office of the State Entomologist completed registration and inspections for over 300 nursery growers and dealers of plants and plant products. Over 375 certificates of export were issued for plant commodities moving out of state or out of country. Over 1,000 beekeepers registered 6,400 hives, and over 900 of these were inspected for diseases of honeybees. In addition, surveys were conducted for a variety of exotic pests and diseases, and 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.

55. MANAGEMENT OF BOXWOOD BLIGHT, A NEW DISEASE OF BOXWOOD AND PACHYSANDRA

Dr. James A. LaMondia and Dr. Katja Maurer, *Assisted by* Michelle Salvas and Nathaniel Child

Boxwood blight is a new, introduced disease in Connecticut. The disease is caused by the pathogenic fungus *Calonectria pseudonaviculata*. The impact of the disease has been staggering; boxwood plant losses have been estimated at $3 million in Connecticut in the first year after discovery. We conducted experiments to identify fungicides with activity and have determined the effects of these plant protection chemicals on conidial germination, leaf infection, and ability to suppress or kill different life stages of the pathogen. These fungicides are being applied alone and in combination at different time intervals to boxwood plants in pots in the greenhouse and at the CAES Valley Laboratory container nursery area to evaluate disease control. These data are being used to develop effective fungicide management programs with different and complementary combinations of active ingredients to prevent and manage disease while following recommendations to reduce the development of fungicide resistance.

56. ENVIRONMENTALLY-FRIENDLY CONTROL OF FIRE BLIGHT ON APPLES

Dr. Quan Zeng *Assisted by M. Hoang*

Fire blight is a serious bacterial disease of apples 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 21st, 2014, the National Organic Standards Board terminated the use of streptomycin in organic fruit production in the US. We aim to develop effective, environmentally friendly, non-antibiotic management options for fire blight. This plot demonstrates the 'Golden Smoothee' apple trees infected with fire blight. We are testing the efficacy of non-antibiotic treatments, a plant sanitizing product (hydrogen peroxide), and a biological control agent (a yeast strain), to the antibiotic treatment (streptomycin) in controlling fire blight.

57. HOPS TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

There is a potential new market for local hop production in Connecticut to support the rapidly expanding local craft brewing industry. Hops are successfully grown in some Northeast states, but no data currently exists for Connecticut. Normally, hops are grown utilizing a high (20 ft) trellis system but that is a determent for many growers because it requires more specialized equipment. In this trial, which is repeated at the Valley Laboratory in Windsor, we are evaluating five disease-resistant hops cultivars when grown with the traditional high trellis system versus a low trellis system (10 ft). At Windsor, low trellis systems will utilize existing tobacco shade tent structures. Plant vigor, cone yields, and disease and insect pest problems of the different cultivars grown utilizing the two trellis systems will be evaluated over the 3 years of this project.

58. HOPS IN NEW ENGLAND

Dr. Katja Maurer, Dr. James A. LaMondia and Dr. Abigail Maynard *Assisted by* Michelle Salvas and Nathaniel Child

Hop (*Humulus lupulus*) cultivation has a long tradition on the Northeast coast of the United States. By the early 17th century, settlers brought this crop from Europe to New England. Due to the humid climate, hops were under high pressure from diseases and pests forcing production to shift to the Northwest coast in the late 19th century. However, recently hop production is on the rise again. The popularity of microbrew culture and local brewpubs as well as the growing demand for regional products has re-established interest in hop cultivation in New England. The female cones (flowers) provide beer with its characteristic bitter and aromatic flavor. Hops are very fast-growing plants with around 2 feet of weekly growth up to a stately size of 13 feet. CAES raises two small hop yards with several cultivars using high and low trellis systems to evaluate yields, growing characteristics, and susceptibility to diseases. The most common diseases and pests are downy mildew, caused by *Pseudoperonospora humuli*, aphids, and mites. The symptoms of downy mildew are stunted short shoots, called spikes, as well as chlorotic and curled down leaves. The general intension is to avoid chemical plant protection, therefore planting disease free plugs or resistant cultivars, sanitation, and removal of diseased plants help to control downy mildew. Nevertheless, at the moment it seems that hops are back in New England for good.

59. HYBRID AND VINIFERA WINEGRAPE CULTIVAR TRIAL

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

The Connecticut component of NE-1020: Multi-State Evaluation of Winegrape Cultivars and Clones consists of 24 hybrid and vinifera cultivars. The vineyard was planted in late spring, 2008. Some of the new cultivars are unreleased selections from breeding programs at Cornell University and the University of Minnesota, while others are newly available cultivars from cool and cold climate areas of Europe. The new cultivars are being compared to established cultivars, which are the same for all states with similar climatic conditions. This planting is the third largest NE-1020 planting in the eastern states. Another, smaller, cultivar evaluation plot has been established at the Windsor station.

60. PINOT GRIS CULTURAL TRIALS

Dr. Francis J. Ferrandino *Assisted by* 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.

61. 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).

62. ASIAN CHESTNUT GALL WASP ON CHESTNUT

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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

63. BEACH PLUM TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

Beach plum (*Prunus maritime* 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.

64. PAWPAW TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

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. Annual yields are recorded from each cultivar.

65. JAPANESE PLUM VARIETY TRIALS

Dr. Abigail Maynard and Dr. David Hill *Assisted by* C. McCarthy

As wholesale marketing of major tree fruits becomes unprofitable, many Connecticut growers are turning to retail sales of their fruit. For a retail operation to be successful there must be a diversity of products. Thus, many growers are interested in adding minor specialty fruits to their operations. Consequently, we have expanded our New Crops Program to include fruits. This trial, also repeated at the Valley Laboratory in Windsor, includes 12 cultivar/rootstock combinations of Japanese plum. Many trees were severely damaged by black knot disease and were removed from the orchard. However, the cultivar Obilinaja (planted in the first row) has been relatively free of the disease.

66. HYBRID ELM TREES

Dr. Sandra L. Anagnostakis *Assisted by* Pamela Sletten

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.

67. THE CONNECTICUT BOTANICAL SOCIETY

Truda Steinnagel

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. Our goals are 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. Our social media connections are: www.ct-botanical-society.org/index.html, www.facebook.com/pages/CT-Botanical-Society/486881834720804, and www.facebook.com/CTNotableTrees.

68. CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION DIVISION OF FORESTRY (CT DEEP DIVISION OF FORESTRY)

Chris Donnelly, Larry Rousseau, Dick Raymond, Jen Hockla, and Hannah Reichle

The CT Department of Energy and Environmental Protection Division of Forestry performs a range of services for the citizens of Connecticut. Our state is about 60 percent forested, making it both one of the most forested and densely populated states in the country. Among its responsibilities, DEEP Forestry manages nearly 162,000 acres of state-owned forestlands, for the health of the forest and for the benefit of those who live in state. We also work with private forestland owners and municipalities, providing assistance with proper forest management, forest health, wildland fire control, the certification of forestry professionals and general technical support. Of the 1.86 million total acres of forest in Connecticut, private landowners own 1.54 million acres. Recent storms and the outbreak of the emerald ash borer have pointed out, again, how important our trees and forests are. At Plant Science Day, the DEEP Forestry program will have representatives of the Private and Municipal Lands program, which focuses its efforts on outreach to the public regarding private forestlands and municipal tree programs, and from the Forest Practices group, which focuses on the certification of forestry professionals and the standards regarding the work performed on forestlands throughout the state. Questions regarding forests, trees, and forest and tree professionals are all fair game for this group.

69. THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION WILDLIFE DIVISION (CT DEEP DIVISION OF WILDLIFE)

Laura Rogers-Castro, Kelly Cannon, and Brendan Zielenski

The CT DEEP Wildlife Division is responsible for managing the state’s wildlife through a program of regulation, research, management, and public education. The Outreach Program within the Division will be displaying hands-on materials for visitors to view during Plant Science Day to learn more about Connecticut’s common wildlife.

70. CONNECTICUT DEPARTMENT OF LABOR CONN-OSHA (CONN OSHA)

Catherine Zinsser

Our mission at the Connecticut Department of Labor, OSHA Division, is to assist employers, in both public and private sectors, in developing and maintaining workplaces free from recognized hazards. This is accomplished through our no-cost on-site consultation program. The state offers the expertise of highly qualified occupational safety and health professionals to employers who request help in establishing and maintaining a safe and healthful workplace.

71. CONNECTICUT ENVIRONMENTAL COUNCIL (CTEC)

Erica Fearn

Connecticut Environmental Council unites individuals, businesses and industry associations that engage in the responsible use of pesticides and fertilizers to beautify, protect and provide healthy spaces and places. CTEC works to improve the quality of life for Connecticut families through leadership, stewardship, sustainability and compliance. CTEC is dedicated to clarifying facts and myths on fertilizer, pesticide and water use in our state. Active in government regulation, CTEC works with policy makers and regulators to be able to provide the best service and products to Connecticut residents. CTEC offers professional development and education opportunities to member businesses. **Making Connecticut's spaces and places beautiful, safe and pest-free.**

72. CONNECTICUT FARM BUREAU ASSOCIATION (CFBA)

Ashley McCullough and Joan Nichols

The Mission of the Connecticut Farm Bureau is to elevate the stature of agriculture in our state. Through education, market promotion and legislative advocacy, we strive to increase farm income and to improve the quality of life not only for Connecticut farmers, but also for their consumers.

73. CONNECTICUT GREENHOUSE GROWERS ASSOCIATION (CGGA)

Susan Pronovost

The Connecticut Greenhouse Growers Association was founded January 1991 as a nonprofit organization devoted to promoting the state's greenhouse industries and assisting growers. CGGA is active in sponsoring educational programs, promoting the value of Connecticut-grown plants to the general public, representing growers' interests before state and federal agencies, and encouraging scientific research benefitting the industry. Perhaps the Association's biggest contribution is bringing together greenhouse growers to interact, network and share ideas in informal settings. Visit our website http://greenhouse.uconn.edu/cgga.

74. CONNECTICUT INVASIVE PLANT WORKING GROUP (CIPWG)

Donna Ellis and Nicole Gabelman

The Connecticut Invasive Plant Working Group (CIPWG) is a statewide organization whose members gather and convey information on the presence, distribution, ecological impacts, and management of invasive plant species. We promote the use of native or other non-invasive ornamental alternatives throughout Connecticut and work cooperatively with researchers, conservation organizations, government agencies, the green industry, and the general public to identify and manage invasive species pro-actively and effectively. The CIPWG website, www.cipwg.uconn provides timely information on non-native invasive plants and their alternatives, including a list of Connecticut invasive species, management information, invasive plant alerts, fact sheets, invasive plant legislation, photos, alternative replacements for invasives, and a calendar of events. For additional information, or to become a member of CIPWG and subscribe to the list serve, please contact Donna Ellis at 860-486-6448; email donna.ellis@uconn.edu.

75. CONNECTICUT NORTHEAST ORGANIC FARMING ASSOCIATION (CT NOFA)

Deb Legge

CT NOFA is the Connecticut Chapter of the Northeast Organic Farming Association. CT NOFA is an independent non-profit organization dedicated to strengthening the practices of ecologically sound farming and gardening, and to the development of local sustainable agriculture. Our efforts give consumers increased access to safe and healthy food. CT NOFA is a growing community of farmers, gardeners, land care professionals, businesses and consumers that encourages a healthy relationship to the natural world. For more information, visit us at www.ctnofa.org, www.facebook.com/ctnofa, www.organiclandcare.net or call 203-308-2584.

76. CONNECTICUT TREE PROTECTIVE ASSOCIATION (CTPA)

Cathy Dvorsky

CTPA is an educational association dedicated to advancing the care of Connecticut's 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.

77. FEDERATED GARDEN CLUBS OF CONNECTICUT, INC.

Arlene Field

The Federated Garden Clubs of Connecticut, Inc. is an educational, charitable non-profit organization made up of 7,053 individual members, 151 clubs and 15 affiliate organizations. It is one of thirteen charter members of the National Council of State Garden

Clubs, Inc., now known as National Garden Clubs, Inc. Our mission is to coordinate, stimulate and encourage higher standards in all aspects of Garden Club work and to protect and conserve natural resources, preserve our heritage and promote civic beauty. Our focus under our current President, Jane Waugh, is to raise consciousness of our members about the plight of pollinators of all types and what we as gardeners can do to help them. We want to encourage members to plant natives to attract pollinators and design landscapes to nurture them. In summary we say, "Bee Kind to Pollinators, Plant Natives and Create Backyard Habitats." We offer educational programs to our members and the community at large, through our national curriculum through our Flower Show School, Landscape Design Study School, Garden Study School and Environmental Study School. Additionally we have resources to address Garden Therapy, Historical and Memorial and Public Gardens, Horticulture, Legislative/Government Action, Public Relations, Scholarships and Youth Activities. The Federation sponsors The Connecticut State Flower Show held annually in Hartford. Visit our website at www.ctgardenclubs.org/.

78. HAMDEN LAND CONSERVATION TRUST

Gail Cameron

The Hamden Land Conservation Trust is a group of Hamden residents who care about open space and work to protect it in our town. We also work to educate the public about ways to promote environmental practices in their own properties. We protect diverse natural environments including forests, woodlands, wetlands, tidal marsh, and more. The many areas that are not too fragile or unsafe for public access are available for walking, bird watching and simply relaxing. Maintaining the diversity of Hamden's habitat areas is at the heart of what we do. Our goal is to preserve what we can of Hamden's last remaining open space parcels, to protect our forests, farmland and other natural features for the benefit of today's families and future generations. The mission of the Hamden Land Conservation Trust is to protect and preserve open space in Hamden through purchase or easements, and to educate the public about conservation issues. www.hlct.org

79. LYMAN HALL HIGH SCHOOL AGRICULTURAL SCIENCE AND TECHNOLOGY PROGRAM

Emily Picard

The Agricultural Science and Technology Program at Lyman Hall High School is a hands-on program that supplements a regular high school academic curriculum for students interested in agriculture or agriculturally related fields. Specialty areas include: Agricultural Mechanics, Aquaculture, Food Science, Large Animal Technology, Plant Science, Small Animal Technology, and Wildlife Biology. Students learn through classroom and laboratory instruction while developing skills to apply this knowledge in real world settings. Agricultural Science provides career readiness and prepares students for post-secondary education. The three components to the Agricultural Science program include Instruction, Supervised Agricultural Experience (SAE), and the National FFA Organization. These components work together to provide optimal opportunities for all students and develop a well-rounded individual. Stop by our table to talk with some current students and teachers! We recruit from nine sending towns, including Hamden.www.LHAgEd.org.

80. UNIVERSITY OF CONNECTICUT EXTENSION MASTER GARDENER PROGRAM (UCONN EXTENSION MASTER GARDENERS PROGRAM)

Jude Hsiang

The UConn Extension Master Gardener Program is an Educational Outreach Program of the University of Connecticut Extension System. Following their special training course, Master Gardeners commit time as volunteers to provide horticultural-related information to the community. Master Gardeners in New Haven County collaborate with parks departments, land trusts, community groups, and educational institutions at all levels to increase environmental awareness through hands-on programs. The University of Connecticut is an Equal Opportunity Employer and Program Provider. New Haven County Extension Center, 305 Skiff St., North Haven, CT 06473, 203 407-3161. http://mastergardener.uconn.edu

81. UNITED STATES DEPARTMENT OF LABOR / OSHA (US OSHA)

Leona May and Tandy Mazo

Our agency's purpose is to assure safe and healthy working conditions for working men and women. Our Federal website is: www.osha.gov. Our local offices are located in Hartford and Bridgeport, CT. To contact your local office call: Hartford 860-240-315 or Bridgeport 203-579-5581. Our exhibit will 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.

82. UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE (USDA APHIS/PPQ)

Eric Chamberlain

The mission of Plant Protection and Quarantine: APHIS-PPQ safeguards U.S. agriculture and natural resources from the entry, establishment, or 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. http://www.aphis.usda.gov. 203 741-5643.

83. UNITED STATES DEPARTMENT OF AGRICULTURE, FARM SERVICE AGENCY (USDA FSA)

Debbie Castle and Teresa Peavey

The Farm Service Agency equitably serves all farmers, ranchers, and agricultural partners through the delivery of effective, efficient agricultural programs for all Americans. We are a customer-driven agency with a diverse and multi-talented work force, dedicated to achieving an economically and environmentally sound future for American agriculture. The goal of our agency is to create a market-oriented, economically and environmentally sound American agriculture by delivering an abundant, safe, and affordable food and fiber supply while sustaining quality agricultural communities. The foundation of FSA's mission and vision rests upon the USDA's long-standing core values of strong ethics, customer service, team work, inclusive decision-making, and fiscal responsibility. For more information visit us at http://www.fsa.usda.gov. 203 269-6665 x100.

84. UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURAL STATISTICS SERVICE, NEW ENGLAND (USDA NASS)

Gary Keough

Agricultural statistics are important because they provide an accurate, unbiased picture of the New England region and U.S. agriculture. Measurement of present and prospective supplies furnishes a sound basis for judgment and action by farmers, agri-businesses, researchers, marketing programs, and agencies which service farmers who take the time to provide the data to make these reports possible. USDA's National Agricultural Statistics Service (NASS) is a network of 12 Regional Field Offices 34 Field Offices (including the New England office in Concord, NH) serving all 50 states and Puerto Rico through cooperative agreements with state departments of agriculture or universities. These field offices regularly survey thousands of farm operators, ranchers, and agri-businesses who voluntarily provide information on a confidential basis. Consolidating these reports with field observations, objective yield measurements, and other data, statisticians then produce state statistics. These statistics are forwarded to NASS headquarters in Washington, D.C., where they are combined and released to the public. The national website is at http://www.nass.usda.gov/ while the homepages for New England and each of the six states are at http://www.nass.usda.gov/Statistics_by_State/New_England (CT, NH, ME, MA, RI, VT) 603 227-3129.

85. UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE (USDA NRCS)

Lisa Krall and Analia Bertucci

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. For more information visit us at: http://www.ct.nrcs.usda.gov. 860 871-4051.

86. WORKING LANDS ALLIANCE

Lisa Bassani

Who we are and how we work is synonymous. That's because Working Lands Alliance is the big tent that convenes people who care passionately about Connecticut's farmland and farmers. We are legislators, farmers, conservationists, anti-hunger groups, planners, land trusts, and local food enthusiasts. We come together to do just one thing: protect Connecticut's vital working lands. Farmland protection is complicated. There are a lot of diverse stakeholders with diverse needs. To be successful requires an active collaboration. Working Lands Alliance is the only entity in CT bringing these stakeholders to the table. Good Policy Starts Here. http://workinglandsalliance.org.

87. PAVILION AT LOCKWOOD FARM

The Connecticut Agricultural Experiment Station's Board of Control approved and is funding, through the William R. Lockwood Trust Fund, a 40'x 120' timber frame pavilion using Connecticut grown lumber. The structure is being built by Steve Strong Timber Frames and Sawmill located in East Hampton and is anticipated to be completed in the Fall of 2015. It will be utilized by the Experiment Station and available to the many agricultural, environmental and public health organizations supported by the Station.

*Other plots here 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.

Revised: July 7, 2015

NOTES

CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875

PLANT SCIENCE DAY is held annually the first Wednesday in August at Lockwood Farm, 890 Evergreen Avenue, Mt. Carmel, Hamden.

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: WWW.CT.GOV/CAES

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