100TH ANNIVERSARY
PLANT SCIENCE DAY



1910

2010



LOCKWOOD FARM, HAMDEN

WEDNESDAY, AUGUST 4, 2010

TABLE OF CONTENTS

Showcase **Page number**

History of Lockwood Farm……………………….……………….……....4

Century Farm Award………..……………………………………….....5

Passport for Children/Activity for Children………………………………6

Connecticut Pesticide Credits…………………………………………….6

The Annual Samuel W. Johnson Lecture………………….…………..7

Schedule of Presentations on Research…………………….……........7

Schedule of Technical Demonstrations…………………….……..…...7

Pesticide Credit Tour……………………………………….……….....9

Lockwood Farm Walking Tour………………………........……..…9

Tour of Native Wood Shrubs……………………………………….….9

Bird and Butterfly Garden Events…………………………………..…..10

Barn Exhibits………………………………………………..……..…….10

Map…………………………………………………..……..……..…..13

Field Plot Listing……………………………………..…..……...14

Field Plot Abstracts……………………………………...…..……..16

Index of Scientists…………………………………………...…......…33

History of The Connecticut Agricultural Experiment Station…...…..….34

HISTORY OF LOCKWOOD FARM, HAMDEN

Lockwood Farm is a research facility of The Connecticut Agricultural Experiment Station. Historically, 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 were 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, which lies to the north. The mountain is composed of basalt, a dense igneous rock 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 basaltic boulder that was plucked from Sleeping Giant by the advancing glacier and 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 that 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, 71.2 inches, was recorded in 1983. 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, 11.3 inches, was recorded in 1972-1973.

The farm provides a field laboratory for many 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 on the first Wednesday in August.

CENTURY FARM AWARD

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

Brown Family Farm
Windsor, Connecticut

The Brown Family Farm, located in the Poquonock section of Windsor, began in 1874. James M. Brown grew Broadleaf tobacco and Havana seed and made his own cigars. In 1938, Hubbell Brown began growing Shade tobacco. The Brown family included other crops over the years, such as potatoes, asparagus, raspberries, and pick-your-own strawberries and peas. During the early 1960's, scenes from the movie "Parrish" were filmed on the property.

Today, pumpkins are grown along with tobacco. Land fallow from Shade tobacco is planted with pumpkins, and during the fall, the fields produce an ocean of orange pumpkins for school tours and families to enjoy the fall harvest season.

Like many Connecticut farms, diversification and adapting to changing times are critical to the survival and sustainability of the Browns' farm. Current and past owners have been progressive in implementing modern farming techniques, such as trickle irrigation to conserve water, as well as improving disease control and plant breeding practices in a working partnership with the Valley Laboratory of The Connecticut Agricultural Experiment Station.

The Brown Family Farm is now in its fifth generation. Day-to-day operations for more than 500 acres of farmland are conducted by Stanton and Jane Brown, daughters Kathi Martin and Susan Connor, and son Kevin Brown. Numerous family members and employees over the years have contributed to the success of the business.

The Brown family is dedicated to the agricultural industry and community interests. The Browns have been members of the Connecticut Farm Bureau and served on the Farm Bureau's National Labor Board. They contribute time to the Windsor Historical Society, Connecticut Tobacco Museum, and are involved in the National Council of Agricultural Employers. Mrs. Brown was chairperson of the local Farm Credit Association and a member of the national Co-Bank board. The Browns also open their farm to community groups and are active in public education on agriculture.

As Governor, I am happy to join with The Connecticut Agricultural Experiment Station and the Connecticut Agricultural Information Council in presenting this Century Farm Award to the Brown family, who are 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 was a leader in the establishment of American agricultural experiment stations.

ANSWERS TO YOUR QUESTIONS (Plot 28)

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.

PASSPORT FOR CHILDREN (Plot K & 54)

This is a special event for children to enjoy and explore Plant Science Day. There are six different stations located throughout Lockwood Farm that they can visit and receive a special stamp for their passport. Once the passport is filled, they can go to the Kid's Korner tent (K) and receive a prize. Brownies can use this to earn the "Plants Try-It!" Once the passport is complete, they can go to the Girl Scout table (Plot 54) to collect their "Try-It!"

ACTIVITY FOR CHILDREN (Plot K & 54)

This is a self-guided activity. Once the activity is complete, they can go to the Kid's Korner tent (K) and receive a prize. Junior Girl Scouts can use this activity to earn the Earth Connections badge. Once this activity is complete, they can collect their badge at the Girl Scout table (Plot 54).

CONNECTICUT PESTICIDE CREDITS (Barn A)

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 (Barn A) 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 between 2:45 p.m.-4:00 p.m.

Connecticut Pesticide Credits Offered: Credits can be applied to ALL CATEGORIES and PRIVATE APPLICATORS (PA). APPLICATORS CAN ASSIGN 3.5 CREDIT HOURS TO ONE CATEGORY OR SPLIT HOURS AMONG MORE THAN ONE CATEGORY.

Visit The Connecticut Agricultural Experiment Station's web page at: www.ct.gov/caes

After the lecture, visitors may remain in the main tent for lunch. Coffee and cold drinks are free.

THE 100th ANNUAL PLANT SCIENCE DAY

10:00 a.m.—GREETING

MAIN TENT, 11:20 A.M.

Louis A. Magnarelli, Director—PRESIDING

CENTURY FARM AWARD

Brown Family Farm, Windsor, CT

REMARKS

Pamela Weil
President, Experiment Station Associates

THE SAMUEL W. JOHNSON MEMORIAL LECTURE

Dr. Dana Royer
Assistant Scientist, Department of Earth & Environmental Sciences, Wesleyan University
"What Fossil Plants Can Tell Us About Climate Change"

PRESENTATIONS ON RESEARCH AND TECHNICAL DEMONSTRATIONS

10:00 a.m. **TECHNICAL DEMONSTRATION TENT Mr. Gregory J. Bugbee, Scientist, Department of Environmental Sciences**
Identification of Invasive Aquatic Plants
(15-minute demonstration, repeated twice during the day, 10:00 a.m. & 1:35 p.m.)
Invasive aquatic plants cause extreme harm to our environment by replacing native species and degrading the aesthetic and recreation value of lakes and ponds. Finding these plants early can prevent their spread. Learn how to identify invasive aquatic plants, what you should do if you find them.

10:20 a.m. **MAIN TENT Dr. Kirby C. Stafford III, Chief Entomologist, Department of Entomology**
Be Our Guest: The History of Plant Science Day
In 2010, we celebrate the 100th anniversary of our summer field day held at our research farm, where the public is invited to be our guest to hear presentations, ask our scientists and staff questions, and visit field plots. The Connecticut Agricultural Experiment Station held its first Field Day on 10 August 1910 at its Centerville Farm, which is now Norwood Avenue at the intersection of Whitney and Washington Avenues in Hamden. The first 19.6 acres of the Mt. Carmel Farm, now called Lockwood Farm, was purchased by the Board of Control late in 1910, the Centerville Farm was vacated in spring 1912, and the first Mt. Carmel Field Day was held in 1913. There was no field day during the war years of 1942-1944, when 16 staff were serving in the Armed Forces. A tractor tour was added in 1949. In 1955, we celebrated the 40th anniversary of the first "double-cross" corn by Dr. Donald F. Jones conducted at the Mt. Carmel Farm. More recent additions include the Bird and Butterfly Garden, wheel-chair accessibility, an air-conditioned bus for tours, activities for children, and the participation of other agricultural and environmental groups. While the farm has expanded, new innovations have been added, and the number of plots has increased, the basic format and mission of our field day to present the work of the Experiment Station to the public has remained the same and relatively consistent over the years.

10:50 a.m. **MAIN TENT Dr. Sandra L. Anagnostakis, Mycologist, Department of Plant Pathology and Ecology**
Chestnut Blight: A Trip Through Time
American chestnut trees (*Castanea dentata*) were once so common in the Eastern United States that everyone who could get to the woods in the fall could count on nuts for roasting and for stuffing their Thanksgiving turkey. Chestnut wood was highly resistant to rot, and used extensively for poles, fencing, and building materials. However, once an "imported" fungus disease was discovered in New York City in 1904, the appearance of our Eastern forests changed dramatically within 50 years. The first report on Chestnut Bark Disease (as Chestnut Blight was first called) was delivered in 1910 by Ms. Flora W. Patterson of the USDA, Washington, DC. In keeping with the historical theme of this 100th anniversary of summer field day, Dr. Anagnostakis, dressed as Ms. Patterson, will take us on a trip though time and will highlight the many research programs and discoveries on Chestnut blight conducted by Station scientists during the past 100 years.

11:05 a.m. **TECHNICAL DEMONSTRATION TENT Dr. Carole A. Cheah, Entomologist, Valley Laboratory and Dr. Todd L. Mervosh, Weed Scientist, Valley Laboratory**
Control Options for Invasive Plants
(15-minute demonstration, repeated twice during the day, 11:05 a.m. & 2:05 p.m.)
Several non-native invasive plants are serious weed problems in natural areas and landscapes of Connecticut. Oriental bittersweet (*Celastrus orbiculatus*), a woody vine that has been in Connecticut for a century, and mile-a-minute (MAM) weed (*Persicaria perfoliata*), a rapidly growing annual vine found in Greenwich, CT in 2000 and now found in 18 towns, are two invasive species. We will show how to identify MAM and will demonstrate effective and practical control methods for these two weeds. In 2009, a tiny, host-specific weevil (*Rhinoncomimus latipes*) was released in Connecticut for biological control of MAM. We will discuss the potential of this weevil for controlling MAM infestations.

11:20 a.m. **MAIN TENT Introductions, Award Presentations, Century Farm Award, and The Samuel W. Johnson Memorial Lecture**

11:45 a.m. **MAIN TENT Guest Speaker, Dr. Dana Royer, Assistant Professor, Wesleyan University**
"What Fossil Plants Can Tell Us About Climate Change"

1:20 p.m. **MAIN TENT Dr. Jeffrey S. Ward, Station Forester Head, Department of Forestry and Horticulture**
Our Dynamic Connecticut Forest: 80 Years of Observations
In 1926, scientists at this Experiment Station began one of the oldest and most comprehensive studies of forest dynamics in the world. In our plots in Haddam and Portland, we have documented over 80 years of growth and mortality using data from 44,835 trees. This study is a benchmark of natural changes and has provided us with insights on how wildfire and defoliations have an effect on Connecticut forests.

1:35 p.m. **TECHNICAL DEMONSTRATION TENT Mr. Gregory J. Bugbee, Scientist, Department of Environmental Sciences**
Identification of Invasive Aquatic Plants
(15-minute demonstration, repeated twice during the day, 10:00 a.m. & 1:35 p.m.)
Invasive aquatic plants cause extreme harm to our environment by replacing native species and degrading the aesthetic and recreation value of lakes and ponds. Finding these plants early can prevent their spread. Learn how to identify invasive aquatic plants and what you should do if you find them.

2:05 p.m. **TECHNICAL DEMONSTRATION TENT Dr. Carole A. Cheah, Entomologist, Valley Laboratory and Dr. Todd L. Mervosh, Weed Scientist, Valley Laboratory**
Control Options for Invasive Plants
(15-minute demonstration, repeated twice during the day, 11:05 a.m. & 2:05 p.m.)
Several non-native invasive plants are serious weed problems in natural areas and landscapes of Connecticut. Oriental bittersweet (*Celastrus orbiculatus*), a woody vine that has been in Connecticut for a century, and mile-a-minute (MAM) weed (*Persicaria perfoliata*), a rapidly growing annual vine found in Greenwich, CT in 2000 and now present in 18 towns, are two invasive species. We will show how to identify MAM and will demonstrate effective and practical control methods for these two weeds. In 2009, a tiny, host-specific weevil (*Rhinoncomimus latipes*) was released in Connecticut for biological control of MAM. We will discuss the potential of this weevil for controlling MAM infestations.

PESTICIDE CREDIT TOUR (meet at BARN A)

12:15pm-1:15pm

12:15 p.m. **MEET AT REGISTRATION DESK (BARN A) Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology**
A 1-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 tour:

- **Dr. Francis J. Ferrandino, Epidemiologist, Department of Plant Pathology and Ecology**
  Powdery Mildew on Chardonnay Winegrapes (Plot 14)
- **Dr. Anuja Bharadwaj, Entomologist, Department of Entomology**
  Natural Products for the Control of the Tick (Ixodes scapularis) (Plot 46)
- **Dr. Richard Cowles, Entomologist, Valley Laboratory**
  A Systemic Insecticide for Integrated Management of Armored Scales in Christmas Trees (Plot 16)
- **Mr. Joseph P. Barsky, Technician, Department of Forestry and Horticulture**
  Demonstration of Japanese Barberry Control Methods. (Plot 50)

2:45 p.m.–4:00 p.m. **SIGN-OUT (for those requesting pesticide credits) (BARN A)**
Attendees pick up Pesticide Credit forms at the registration table in Barn A.

LOCKWOOD FARM WALKING TOURS (meet at BARN A)

2:15 p.m. – 3:15 p.m.

2:15 a.m. **MEET AT REGISTRATION DESK (BARN A) Dr. Robert E. Marra, Forest Pathologist, Department of Plant Pathology and Ecology**
A 1-hour guided tour of selected Barn Exhibits and 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.

2:15 p.m. – 3:15 p.m. **WALKING TOUR**, Approximately ½ mile, moderately hilly
Stops on Tour:

- **Dr. Sandra Anagnostakis, Mycologist, Department of Plant Pathology and Ecology**
  Chestnut Species and Hybrids (Plot 80)
- **Dr. Abigail A. Maynard, Horticulturist, Department of Forestry and Horticulture**
  Beach Plum, Paw-Paw, and Japanese Plum Variety Trials (Plot 88)
- **Dr. William Nail, Viticulturist, Department of Forestry and Horticulture**
  Hybrid and Vinifera Winegrape Cultivar Trials (Plot 86)
- **Dr. Robert Marra, Forest Pathologist, Department of Plant Pathology and Ecology**
  Biological control for bacterial spot of peaches (Plot 87)
- **Dr. Kimberly Stoner, Entomologist, Department of Entomology, and Dr. Brian Eitzer, Chemist, Department of Analytical Chemistry**
  Measuring Pesticides in Squash Pollen and Nectar (Plot 71)

TOUR OF NATIVE WOODY SHRUBS (PLOT 76)

12:00 p.m. – 12:30 p.m.

12:00 p.m.-12:30 p.m. **MEET AT THE WOOD ARBOR OF THE NATIVE WOODY SHRUBS 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, Head Department of Forestry and Horticulture. Learn about using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

BIRD AND BUTTERFLY GARDEN EVENTS (PLOT 75)

11:00 a.m. & 1:00 p.m.

11:00 a.m. **MEET AT THE BIRD AND BUTTERFLY INFORMATION TABLE Ms. Jane Canepa-Morrison, Valley Laboratory**
Ms. Jane Canepa-Morrison will demonstrate "Deadheading Perennials: "The Why, When, and Where".

1:00 a.m. **MEET AT THE BIRD AND BUTTERFLY INFORMATION TABLE Mr. Jeffrey Fengler, Department of Entomology**
Mr. Jeffrey Fengler will lead a "Butterfly Identification Walk".

BARN EXHIBITS (BARN B)

100 Years of Advancement in Measurement Science Applied to Food and Environmental Safety
Department: Analytical Chemistry
Investigators: Dr. Brian D. Eitzer, Dr. Walter J. Krol, Dr. Christina S. Robb, and Dr. Jason C. White
Assisted by: Ms. Terri Arsenault, Mr. William A. Berger, Mr. Craig L. Musante, and Mr. John F. Ranciato
Abstract: For 100+ years the Analytical Chemistry department has been making measurements of environmental parameters such as the level of nitrogen in fertilizers. However, the methods used have gone from gravimetric and titrimetric techniques to instrumental-based techniques that have far greater sensitivity and now allow us to routinely analyze many parameters such as pesticides or heavy metals at parts per billion concentrations. These new methods allow us to better ensure food safety and environmental quality.

From Hybrid Corn to Sequenced Genomes: 100 Years of Plant Genetics
Department: Biochemistry and Genetics
Investigators: Dr. Neil A. McHale, Dr. Richard B. Peterson, Dr. Neil P. Schultes, Dr. Douglas W. Dingman
Assistants: Ms. Carol R. Clark and Ms. Regan B. Huntley
Abstract: The science of genetics began in the 1860s with careful observations on the inheritance of seed shape and color in the garden pea. Decades ahead of his time, Gregor Mendel, and Austrian botanist, deduced that hereditary traits are governed by genes passed from one generation to the next. By the turn of the century, scientists realized that all plant characters were inherited according to Mendel's laws, setting the foundation for genetic improvement of agricultural plants through controlled breeding. A seminal breakthrough in plant breeding came right here at the Lockwood Farm in 1917, when Dr. Donald Forsha Jones discovered a method for production of F1 hybrid varieties of corn. The science of genetics took another giant leap forward in 1952 with the discovery by James Watson and Francis Crick (neither person affiliated with this Experiment Station) that genes were actually polymers of DNA arranged in a self-replicating double helix. Now we can isolate individual genes to study their function, and sequence the entire genome of any living plant, opening a variety of new avenues to genetic improvement of agricultural crops in the future.

Entomology – Then and Now
Department: Entomology
Investigators: Dr. Kirby C. Stafford III, Dr. Anuja Bharadwaj, Dr. Carole A. Cheah, Dr. Richard S. Cowles, Ms. Bonnie L. Hamid, Dr. Louis A. Magnarelli, Dr. Chris T. Maier, Dr. Gale E. Ridge, Dr. Claire E. Rutledge, Dr. Victoria L. Smith, and Dr. Kimberly A. Stoner
Assistants: Ms. Elizabeth E. Alves, Ms. Tia M. Blevins, Mr. Jeffrey M. Fengler, Ms. Rose T. Hiskes, Mr. Ira J. Kettle, Ms. Morgan F. Lowry, Mr. Stephen J. Sandrey, Ms. Heidi R. Stuber, Mr. Peter W. Trenchard, and Ms. Tracy Zarrillo
Abstract: The Department of Entomology and Office of State Entomologist was established in 1901. At the time of our first Field Day in 1910, entomologists were studying methods to control San Jose scale, gypsy moth, mosquitoes, and other pests, studying the biology of various insects, identifying insects, conducting nursery inspections, and began examining honey bee hives for foulbrood. Today, most of the pest issues have changed; two examples are the emergence of Lyme disease and possible presence of the Asian longhorned beetle. Others, like bed bugs have re-emerged. Departmental staff members continue to conduct research, answer insect inquiries, survey for pests, inspect nurseries to facilitate trade of pest-free stock, and examine honey bee colonies.

Department of Environmental Sciences: 100 Years of Research and Service
Department: Environmental Sciences
Investigators: Dr. Theodore G. Andreadis, Dr. Philip M. Armstrong, Gregory J. Bugbee, Dr. Goudarz Molaei, Dr. Joseph J. Pignatello, and Dr. Charles R. Vossbrinck

Assisted by: Ms. Shannon L. Finan, Ms. Bonnie L. Hamid, Mr. Michael J. Misencik, Ms. Angela B. Penna, Mr. John J. Shepard, Mr. Michael C. Thomas, and Mr. Michael P. Vasil

Abstract: Experiment Station research on soils began in 1882. In 1923, the Department of Soils was established by Dr. M. F. Morgan, who eleven years later, developed the world's first test for rapid analysis of soil fertility, which is still used today. Early investigations focused on changing lake conditions of lakes and the cycling of nutrients in soil, water and sediments, surveys of coastal wetlands, and using sewage sludge and compost as soil amendments to recycle organic wastes to improve soil. The department has evolved over the years in an effort to address important scientific issues of the day and encompass the research and service activities of the staff. Climatological studies were initiated in 1956 (Department of Soils & Climatology), and in 1969, the study of water was added (Department of Soil & Water). The new Department of Environmental Sciences was established in 2009. Current research activities include: survey and control of invasive aquatic weeds in Connecticut lakes, investigating the movement and reactions of chemical pollutants in soil and ground water and methods for remediation of contaminants, development of novel methods and more effective strategies for surveillance and control of mosquitoes and mosquito-associated diseases, and development of molecular-based methodologies for identification of plants, insects and microbial pathogens. The department is additionally responsible for conducting the state-wide Mosquito and Arbovirus Surveillance Program for eastern equine encephalitis and West Nile viruses and providing soil testing services for fertility.

Vegetable Research – Then and Now

Department: Forestry and Horticulture

Investigators: Dr. Abigail A. Maynard and Dr. David E. Hill

Assistant: Ms. Holly Neckerman

Abstract: In 1910, vegetable crops were grown to study their genetics, diseases, and insects. There were no cultural or variety trials and there were only two vegetable crops growing at our farm plots during, the first Field Day. One hundred years later, as part of our New Crops Program, 20 vegetable crops are being studied at Lockwood Farm and our Valley Laboratory in Windsor. Many of the crops being evaluated are ethnic or specialty vegetables not normally grown in Connecticut. Research includes variety trials and experiments to determine the best cultural methods for growing the crops in Connecticut.

Plant Pathology and Ecology: 100 Years of Contributions to Plant Health in Connecticut

Department: Plant Pathology and Ecology

Investigators: Dr. Sharon M. Douglas, Dr. Sandra L. Anagnostakis, Dr. Wade H. Elmer, Dr. Francis J. Ferrandino, Dr. Yonghao Li, and Dr. Robert E. Marra

Assistants: Ms. Mary K. Inman, Ms. Pamela Sletten, and Mr. Peter W. Thiel

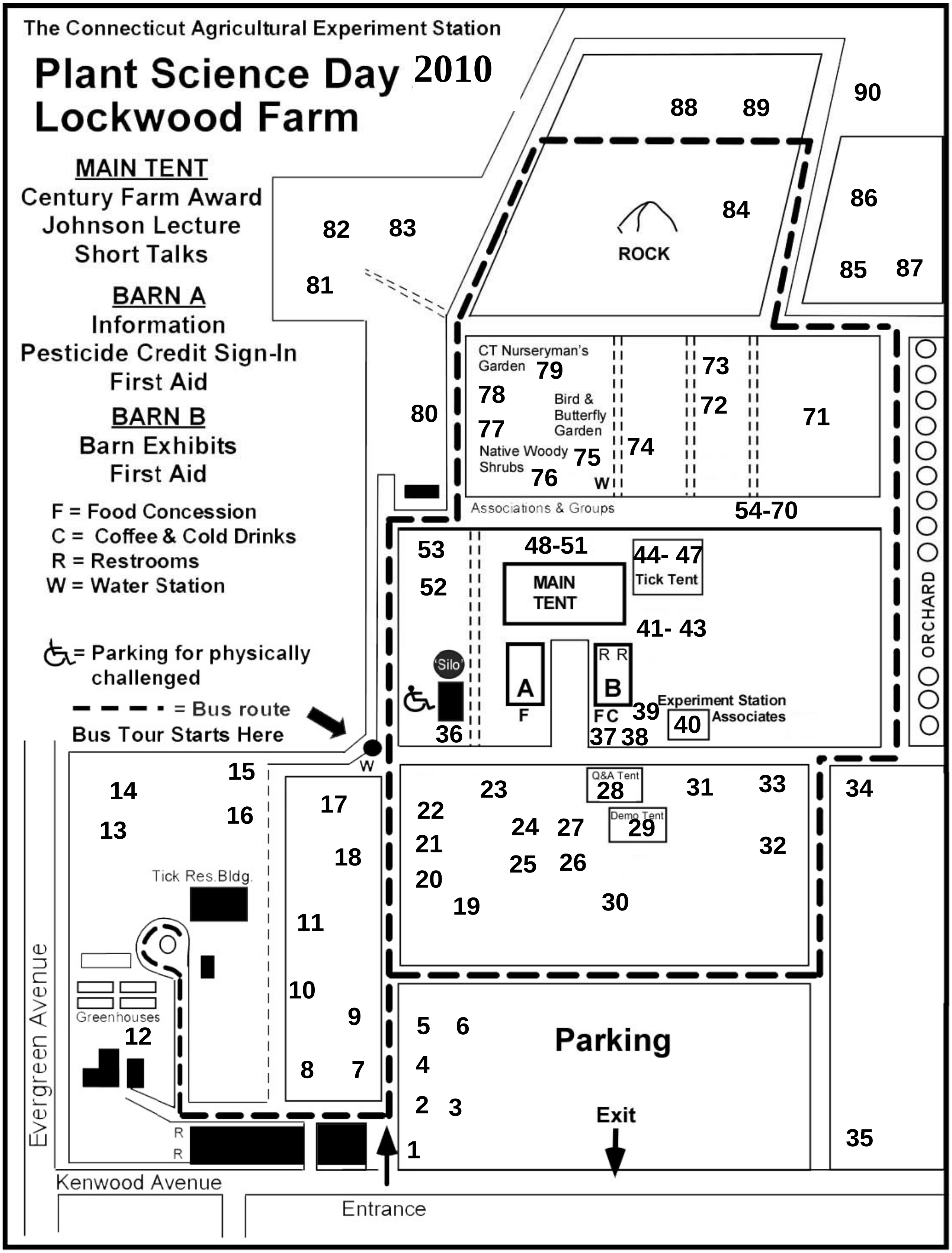
Abstract: The Department of Plant Pathology and Ecology continues its role in shaping the science of plant pathology through research and service. Examples include discovering the cause of potato scab, designing the first knapsack sprayer for fungicide trials, breeding chestnuts for resistance to chestnut blight, developing the first computer model of a plant disease epidemic, investigating dieback of salt marshes, conducting studies on the efficacy of biological and biorational products to manage plant diseases, modeling disease epidemics and aerial dispersal of spores and pollen, and investigating diseases of forest and landscape trees. The department also maintains a service program that includes disease diagnosis, presentations, and outreach.

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

TO RECEIVE A COMPLETE LIST OF STATION SPEAKERS: inquire at the publications table in barn A, write to: Publications; The Connecticut Agricultural Experiment Station; P.O. Box 1106; New Haven, CT 06504-1106, phone 203-974-8447, fax 203-974-8502, e-mail Vickie.Bomba-Lewandoski@ct.gov, or on the web at http://www.ct.gov/caes/cwp/view.asp?a=2812&q=345128.

TO RECEIVE A COMPLETE LIST OF AVAILABLE EXPERIMENT STATION PUBLICATIONS: Inquire at the publications table in barn A, write to: Publications; The Connecticut Agricultural Experiment Station; P.O. Box 1106; New Haven, CT 06504-1106, phone 203-974-8447, fax 203-974-8502, e-mail Vickie.Bomba-Lewandoski@ct.gov, or on the web at http://www.ct.gov/caes/cwp/view.asp?a=2826&q=378184.



Map Not to Scale

FIELD PLOT LISTING

Outside Organizations (#36, #39, and #54-#70) invited to participate

1. Chinese Chestnut Trees
2. Sheet Composting with Oak and Maple Leaves
3. Sweet Potato Trials
4. Pak Choi Trials
5. Edamame Trials
6. Specialty Pumpkin Trials
7. Specialty Eggplant Trials
8. Personal-Sized Watermelon Variety Trials
9. Vegetable Amaranth Trials
10. Butternuts and Heartnuts
11. Use of Earthworms and Biochar to Suppress Fusarium Crown Rot of Asparagus
12. Factors Affecting Composition of Hydroponic Spinach.
13. Environmentally-Friendly Control of Powdery Mildew on Landscape Plants
14. Powdery Mildew on Chardonnay Winegrapes
15. Biological Control of Hemlock Woolly Adelgid and Mile-a-Minute Weed
16. A Systemic Insecticide for Integrated Management of Armored Scales in Christmas Trees
17. Using Soybean Meal and Corn Gluten on Turf
18. The Role of Genetics in Invasions: Does Variable Leaf Watermilfoil (Mryiophyllum heterophyllum) Invasiveness Differ Among Distinct Genetic Lineages?
19. Commercial Chestnut Cultivars
20. Table Grape Demonstration Plot
21. Hybrid Winegrape Cultivar Trial
22. Comparison of Graft Union Height on Chardonnay Grapevines
23. Biochar Added to Soil—What Impact will it have on Organism Interactions?
24. Control of Blight on American Chestnuts
25. Seedlings of Old Surviving American Chestnuts
26. New Hybrid Chestnut Orchard
27. Wild Chestnuts from Turkey
28. Question and Answer Tent
29. Technical Demonstration Tent
30. CAES Weather Station
31. Invasive Alien Insects in Connecticut
32. Composting Leaves using the Static Pile Method
33. Nanoparticle Toxicity to Agricultural Plants
34. Phytoremediation: Using plants to Clean Contaminated Soil
35. Nut Orchard
    36. Verizon Telephone Transmission Silo
37. Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis Viruses
38. Life in the Soil
    39. The Farmer's Cow
40. Experiment Station Associates
41. Identification of Common Garden Pests
42. Oilseed crops for biological control of soilborne pathogens
43. Common Indoor Molds
44. Lyme Disease in Ticks from Connecticut Citizens
45. The "Deer" Tick *Ixodes scapularis*

46. Natural Products for the Control of the Tick *Ixodes scapularis*
47. Seasonal Prevalence of Antibodies to Tick-Transmitted Pathogens in Deer
48. Effectiveness of Deer Repellents in Connecticut
49. The Japanese Barberry Microclimate Enhances Blacklegged Tick Survival
50. Demonstration of Japanese Barberry Control Methods
51. Invasive Aquatic Plant Program
52. Using Leaf Compost in Home Gardens
53. A Vegetable Garden from 100 Years Ago
    54. Girls Scouts of Connecticut
    55. Connecticut Chapter of The Society of American Foresters
    56. USDA, National Agricultural Statistics Service, New England Field Office
    57. Connecticut Tree Protective Association
    58. Connecticut Farmland Trust
    59. Connecticut Department of Agriculture
    60. Connecticut Professional Timber Producers Association
    61. Connecticut Farm Bureau Association
    62. Connecticut Green Industries
    63. Connecticut Groundskeepers Association and Connecticut Environmental Council
    64. Connecticut Department of Environmental Protection: Division of Forestry
    65. University of Connecticut Master Gardeners
    66. Connecticut Northeast Organic Farming Association
    67. USDA, Animal and Plant Health Inspection Service, Plant Protection and Quarantine
    68. USDA Natural Resources Conservation Service
    69. United States Department of Labor/ OSHA
    70. Connecticut Invasive Plant Working Group
71. Measuring Pesticides in Squash Pollen and Nectar
72. Suppression of Foliar Diseases of Zinnias.
73. Inducing Fusarium Disease Resistance in Gladiolus
74. Eastern Bluebird *Sialia sialis* Nest Box Trail
75. Bird and Butterfly Garden
76. Native Woody Shrubs
77. Bees, Trees, and Commodities: The Survey and Inspection Team
78. *Cerceris fumipennis*, the Beetle Hunting Wasp
79. Connecticut Nurserymen's Garden
80. Chestnut Species and Hybrids
81. Dense Planting of American Chestnuts
82. Dwarf Hybrid Chestnut Trees
83. Ozark Chinquapin Trees
84. Rocky Hill American Chestnut Trees
85. Pinot Gris Cultural Trials
86. Hybrid and Vinifera Winegrape Cultivar Trial
87. Biological control for bacterial spot of peaches
88. Beach Plum Trials
89. Japanese Plum Variety Trials
90. Hybrid Elm Trees

FIELD PLOT ABSTRACTS

The plots at Lockwood Farm are planted and maintained by Experiment Station scientists with the extensive help of Farm Manager R. Cecarelli and his assistants, R. Hannan and M. McHill and the following summer workers: L. Bespuda, D. Chen, C. Remetz, and W. Ryan.

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

2. SHEET COMPOSTING WITH OAK AND MAPLE LEAVES
A. Maynard and D. Hill *Assisted by* H. Neckerman
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 1995-2009 and incorporated into the soil by rototilling. Last year, lettuce, peppers, onions, and carrots were grown with all plots receiving the same amount (1300 lb/A) of 10-10-10 fertilizer. Yields from plots amended with oak leaves were compared to plots amended with maple leaves and the unamended controls. In 2009, lettuce yields from the control plots and plots amended with maple leaves were slightly greater (1.5 lbs/head) compared to yields from plots amended with oak leaves (1.3 lbs/head). The greatest pepper yields were from the plots amended with maple leaves (4.7 lbs/plant) followed by plots amended with oak leaves and the unamended control plots (4.6 and 4.5 lbs/plant, respectively). The greatest carrot yields were from the control plot (3.4 lbs/10 ft row) followed by plots amended by oak leaves (3.2 lbs/10 ft row) and plots amended with maple leaves (2.6 lbs/10 ft row). The greatest onion yields were from the plots amended with maple leaves (17.4 lbs/10 ft row) followed by the control plots (16.0 lbs/10 ft row) and plots amended with oak leaves (14.1 lbs/10 ft row).

3. SWEET POTATO TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
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 but we have found that they can easily be grown in Connecticut. In this trial, we are looking at several cultivars that have short maturities (90 days). The cultivars will be evaluated on yield and quality. This experiment is also repeated at our Valley Laboratory in Windsor. Last year, Carolina Ruby averaged the greatest yields (3.3 lbs/plant) with both Beauregard and Red Japanese averaging 3.1 lbs/plant.

4. PAK CHOI TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
From 2000 to 2006, the Asian population in Connecticut grew 42%. This and other ethnic groups wish to continue consumption of vegetables that are customarily in their diets, thereby giving farmers opportunities for production of crops with a ready market. Ethnic vegetables also appeal to high-end buyers for whom ethnic vegetables are not everyday fare, but who enjoy gourmet produce and culinary variety. Many farmers wish to diversify their operations by growing ethnic vegetables but there is little information on the culture of these vegetables in Connecticut. In this trial, we are evaluating 12 varieties of pak choi here and at our Valley Laboratory in Windsor. The spring planting was harvested in June and a fall planting will be harvested in September. Last year, in spring, Joi Choi (18.2 t/A) and Black Summer (14.5 t/A) had the greatest yields. The cultivar Bonsai bolted at both sites in the spring and was unmarketable. In fall, Joi Choi (13.2 t/A) and Win-Win Choi (11.2 t/A) had the greatest yields.

5. EDAMAME TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
Edamame are specialty varieties of soybeans that are harvested in the green stage. The word "edamame" means "beans on branches" and it grows in clusters on bushy branches. Edamame is consumed as a snack, a vegetable dish, used in soups or processed into sweets. As a snack, the pods are lightly boiled in salted water, and then the seeds are squeezed directly from the pods into the mouth with the fingers. Outside East Asia, edamame is most often available in Japanese restaurants and some Chinese restaurants, but it has also found popularity elsewhere as a healthy food item. We are conducting variety trials here and at our Valley Laboratory in Windsor. Varieties will be evaluated on yield and quality.

6. SPECIALTY PUMPKIN TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
The typical predominant market for pumpkins is for jack-o'-lantern types (12 lbs to 20 lbs). However, small pumpkins are often needed for operations specializing in school tours where each child receives a pumpkin to take home. Smooth pumpkins are preferred for painting or coloring. Specialty pumpkins come in a wide range of colors and color combinations including white, pale green, tan, burnt orange, and yellow. Shape also varies from the ideal round, to squatty with a flattened or concave top, to oval, to tall and elongated. This trial, which is also repeated at the Valley Laboratory in Windsor, is evaluating 13 different varieties of specialty pumpkins on yield and quality. Last year, Gooligan (8.9 fruit/plant), Lil' Pump (7.6 fruit/plant), Baby Boo (7.3 fruit/plant), and Hooligan (7.2 fruit/plant) had the greatest yields.

7. SPECIALTY EGGPLANT TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
Eggplants are a botanically diverse group that can be divided into two groups based on fruit shape and color. The first group and more traditional type are the teardrop-shaped, large-fruited eggplant. The second group is collectively referred to as the "specialty" eggplants. Fruit shapes of specialty eggplants vary, but are often long and smooth, ball- or bell-shaped. Fruit colors widely range from white, to green, to purplish black, to purple. Japanese and Chinese eggplants tend to be long and thin, looking like purple fingers. White, green, and striated versions of these cultivars are also available. Thai eggplants, on the other hand, are more spherical, and also display a range of colors. Thai eggplant can also be very small, with one version looking remarkably like a chicken egg. Asian eggplants are used extensively in Oriental cuisine, but also can be used in Western dishes. They are sweet and tender, in contrast to traditional eggplant which has a slightly bitter flavor. This trial, which is also repeated at the Valley Laboratory in Windsor, is evaluating 10 different varieties of specialty eggplant on yield and quality.

8. PERSONAL-SIZED WATERMELON VARIETY TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
The newest watermelons in the marketplace are seedless mini "personal" watermelons. They offer an attractive alternative for the consumer that has limited refrigerator space or for small families. These melons, weighing 3-7 pounds each, first became widely available in markets in 2003. They generally have a thinner rind which means more edible flesh. Tests in Oklahoma have revealed that these watermelons are an excellent source of lycopene and beta-carotene. Last year, Bravo (3.7 fruit/plant), Mielhart (2.8 fruit/plant), Vanessa (2.6 fruit/plant), and Leopard (2.4 fruit/plant) had the greatest yields. Vanessa (11.4) and Bravo (11.1) averaged the highest Brix (sugar) values. We are repeating our trial with 7 varieties this year. These trials are also being conducted at our Valley Laboratory in Windsor.

9. VEGETABLE AMARANTH TRIALS
A. Maynard and D. Hill *Assisted by* H.Neckerman
Vegetable Amaranth (Callaloo) is an annual that is native to central Mexico. In Asia and the West Indies, amaranth is widely used in soup. Although it is relatively unknown as a vegetable crop in the United States, it has traditionally been cultivated throughout the humid tropics and is consumed extensively in Africa, Asia, the Caribbean, and Latin America. The greens are of considerable nutritional value being high in calcium, magnesium, iron, vitamins A and C as well as protein. Last year, All Red (3.7 lb/plant), Red Striped Leaf (3.3 lb/plant), and Tender Leaf (2.6 lbs/plant) averaged the greatest yields. We are repeating the trial this year with the same 8 cultivars planted here and at our Valley Laboratory in Windsor.

10. BUTTERNUTS AND HEARTNUTS
S. Anagnostakis *Assisted by* P. Sletten
Seedling butternut (*Juglans cinerea*) and heartnut (*J. ailantifolia*, Japanese walnut) were planted here in 2008 to test their resistance to the serious diseases that are eliminating American butternuts from their habitat. Most of the "butternut" trees in

Connecticut that we have examined are, in fact, hybrids of butternut with heartnut, including the former National Champion Butternut. These small trees came from Tennessee, and will be checked for species as well as for disease resistance.

11. USE OF EARTHWORMS AND BIOCHAR TO SUPPRESS FUSARIUM CROWN ROT OF ASPARAGUS
W. Elmer Assisted by P. 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 also has 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.

12. FACTORS AFFECTING COMPOSITION OF HYDROPONIC SPINACH
M. Gent *Assisted by* K. Kalapos.
The composition of salad greens is affected by environment, sunlight and temperature, and by the nature of the fertilizer used to grow the plants, such as the concentration of nitrate. Thus the nutritional value changes with time of year and fertilization practices. We set up a continuous-recirculation hydroponics system to grow spinach. Crops were planted and harvested at various times during the year, to compare results under conditions that differ in light and temperature, or nitrate availability. The rate of growth, dry matter content and leaf area are determined when plants are harvested. Sub-samples of plant material are freeze-dried to analyze the tissue for mineral elements, nitrate, sugars, and other metabolites. These studies will determine how environment changes composition and dietary value of greenhouse-grown spinach. We will compare these results to those of an earlier experiment with lettuce.

13. ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON LANDSCAPE PLANTS
F. J. Ferrandino
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 contains a number of common perennial landscape plants (lilac, deciduous azalea, bee balm, peony and phlox) as well as common annual flowers (zinnia and rudbeckia, commonly called “black-eyed susans”), 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.

14. POWDERY MILDEW ON CHARDONNAY WINEGRAPES
F. J. Ferrandino
Wine grapes and wineries are a relatively new industry in Connecticut. In the past decade, acreage planted to winegrapes has gone from 160 A to 340 A and the number of wineries has gone from 15 to 30, producing about 300,000 gallons of wine valued at between 8-10 million dollars per year. In our climate, powdery mildew has the greatest impact on wine-grape yield of all pathogens and pests. This plot has 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.

15. BIOLOGICAL CONTROL OF HEMLOCK WOOLLY ADELGID AND MILE-A-MINUTE WEED
C. Cheah
Hemlock woolly adelgid (HWA) has been a serious forest, nursery and landscape exotic pest since its first detection in Connecticut in 1985. In response to the HWA threat to eastern hemlocks, the Experiment Station, with the support of the USDA Forest Service discovered, reared and released the tiny Japanese ladybeetle, *Sasajiscymnus tsugae,* for biological control of HWA. To date, > 176,000 *S. tsugae* have been released in 26 sites statewide in Connecticut, the majority occurring between 1995 and 2001, and since 2005, there has been widespread recovery of forest hemlocks. Mile-a-minute weed was initially reported in Connecticut in 1997 and is currently found in 18 towns. In 2009, a tiny weevil, *Rhinoncomimus latipes*, was released in Connecticut as a part of the federal biological control program for MAM. Updates on the current pest status of these two invasive species with information on the biological control programs are presented.

16. A SYSTEMIC INSECTICIDE FOR INTEGRATED MANAGEMENT OF ARMORED SCALES IN CHRISTMAS TREES
R. Cowles *Assisted by* S. Lamoureux

Christmas tree growers have had increasing problems over the last decade with armored scales in their plantations. Species of scales affecting their trees are: hemlock scale (spruces), cryptomeria scales (true firs), and elongate hemlock scale (true firs and Douglas-fir). Products that in the past have been used to target these scales include a relatively toxic systemic organophosphate (dimethoate), and a broad-spectrum and long-residual pyrethroid (bifenthrin) that is incompatible with integrated pest management because it excludes valuable beneficial insect and mite predators and parasitoids. Horticultural oil could be compatible with integrated management of scales, but can cause injury to certain species of trees (Douglas-fir and balsam fir), and permanently changes the surface waxes of spruces, so that "blue" spruces appear dark green. The insecticide dinotefuran (Safari) was investigated for its ability to penetrate bark, be transported to foliage, and suppress scale populations. In two field experiments conducted in 2009, Safari applied as a basal bark spray was found to suppress scale populations without negatively impacting predator and parasite populations. The relationship between mortality of scales, dosage, and height of the tree were found to be described in one equation, and so the degree of population suppression of scales can now be predicted based on these variables. Growers in several states are now adopting this approach for managing armored scales in their Christmas tree plantations.

17. USING SOYBEAN MEAL AND CORN GLUTEN ON TURF

A. Maynard and D. Hill *Assisted by* H. Neckerman

Soybean meal is a byproduct in the production of biodiesel fuel from soybeans. It is about 7% nitrogen and can be used for animal feed and as an organic fertilizer. Corn gluten meal is a byproduct in the production of cornstarch. It can also be used for animal feed and as an organic fertilizer. It also has been found to be an effective preemergent natural herbicide. In this demonstration plot, we are evaluating the effectiveness of these organic fertilizers in the growth of turf compared to conventional lawn fertilizer. All plots received the same amount of nitrogen (1 lb/1000 sq. ft.). Last year, the weight of the grass clippings averaged 82% greater from plots fertilized with lawn fertilizer compared to the unfertilized control. Plots fertilized with soybean meal averaged 32% greater and plots fertilized with corn gluten averaged 30% greater than the unamended control plots.

18. THE ROLE OF GENETICS IN INVASIONS: DOES VARIABLE LEAF WATERMILFOIL (*Mryiophyllum Heterophyllum*) INVASIVENESS DIFFER AMONG DISTINCT GENETIC LINEAGES?

H. Tavalire

Many studies and conceptual papers cite hybridization prior to introduction as a way plants come to exhibit more aggressive growth traits. The question then becomes whether hybrid plants are 'more invasive' than non-hybrid plants and what role hybridization plays in invasion. Within the *Myriophyllum heterophyllum* (variable-leaf milfoil-VLM) system, several genetic types from different sources have invaded the Northeast United States, one of which is a hybrid (*M. heterophyllum x M. laxum*). These introduced genetic types are remaining distinct and seem to, anecdotally, exhibit different growth patterns. This part of my research uses a common garden set up to answer the following questions in the VLM system: (1) Is there a genetic basis for invasive growth? And (2) Are the hybrids more invasive? Three genetic types (including the hybrid) from six sources are present in each tank (treatment) to test whether or not they exhibit the same growth patterns.

19. COMMERCIAL CHESTNUT CULTIVARS

S. Anagnostakis *Assisted by* P. Sletten

These grafted trees are commercial cultivars of orchard chestnut trees. Included is 'Colossal', which is the most frequently planted commercial cultivar in the U.S., with large acerages on the west coast. Cultivar 'Nevada' is the pollinizer usually planted to provide pollen for 'Colossal' but we have found it to be too susceptible to blight. We are evaluating the potential of these commercial cultivars of chestnut trees for Connecticut.

20. TABLE GRAPE DEMONSTRATION PLOT

W. Nail *Assisted by* H. Neckerman

The row to the south and the two rows to the north of the hybrid winegrape trials consist of 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. Each row is trained to a different training system: Vertical Shoot Positioning, Hudson River Umbrella, and Smart-Dyson.

21. HYBRID WINEGRAPE CULTIVAR TRIAL

W. Nail *Assisted by* H. Neckerman

Connecticut's mild, humid growing seasons and cold winters prevent the successful cultivation of many well-known winegrape cultivars. Many varieties fail to ripen properly in most years. Less cold-hardy cultivars suffer extensive damage or death during and after severe winter freeze events. The hybrid cultivars Chambourcin, Seyval, Villard Blanc, and Villard Noir are being evaluated for yield and fruit quality.

22. COMPARISON OF GRAFT UNION HEIGHT ON CHARDONNAY GRAPEVINES

W. Nail *Assisted by* H. Neckerman

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. Comparisons for yield, fruit quality, and winter damage began in 2009 and will continue for a minimum of three more years. High grafted vines had significantly higher yields than low grafted vines in 2009.

23. BIOCHAR ADDED TO SOIL—WHAT IMPACT WILL IT HAVE ON ORGANISM INTERACTIONS?

J. Pignatello *Assisted by* C. Lattao and J. Ni

Biochar is a charcoal-like product from heat treatment of waste biomass. It has potential value as a soil amendment in agriculture and as a sequestered form of carbon with implications for climate change. Some studies show positive effects of biochar application on crop yield or quality and have attributed these effects to improved nutrient regulation or soil water-holding capacity. However, other studies show insignificant or even negative effects indicating a more complex situation. Regrettably, few studies have looked at the influence of biochar on species interactions in soil. Plant-microbe, plant-microbe-insect, and microbe-microbe interactions in soil often play an essential role in the quality and yield of many crops. Species interactions are often controlled by natural chemicals acting as signaling agents between organisms. Charcoals in general are reputed to be potent adsorbents of organic chemicals. Thus, through adsorption, biochar may reduce the biological availability of signaling chemicals and disrupt molecular processes critical for species interactions. In a multi-disciplinary collaboration among CAES and Yale scientists several systems are being tested, some highlighting desirable and some undesirable impacts of biochar on species interactions. Preliminary data for two are presented to illustrate the promise of this research. We looked at the potential of biochar to adsorb an antibiotic commonly administered to pigs and excreted in their manure and urine, which ultimately reaches soil. The presence of antibiotics in soil poses a hazard due to the potential for induction of antibiotic resistance gene transfer to pathogenic bacteria. A second system involves the ability of biochar to adsorb natural toxins in soil known as allelochemicals that inhibit asparagus regrowth.

24. CONTROL OF BLIGHT ON AMERICAN CHESTNUTS

S. Anagnostakis *Assisted by* P. 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* (cultivar 'Clapper') and have intermediate resistance to blight.

25. SEEDLINGS OF OLD SURVIVING AMERICAN CHESTNUTS

S. Anagnostakis *Assisted by* P. 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 interplanted with seedlings from crosses of American trees here at Lockwood Farm. We will compare their winter hardiness and blight resistance with that of the European chestnut trees from Turkey and the old American chestnut trees north of them.

26. NEW HYBRID CHESTNUT ORCHARD

S. Anagnostakis *Assisted by* P. Sletten

These small 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.

27. WILD CHESTNUTS FROM TURKEY

S. Anagnostakis *Assisted by* P. 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 and resistance to chestnut blight disease with that of American chestnut trees and with the seedlings from "old survivors" planted next to them.

28. QUESTION AND ANSWER TENT

Y. Li, R. Hiskes, M. Inman, T. Mervosh, and G. Ridge

This is a great opportunity to ask the experts about growing plants, testing soil and identifying plants, plant diseases, and insects. Bring samples of soil, symptomatic plants, and insects for testing and identification. Visit the displays and pick up fact sheets about current insect and disease problems.

29. TECHNICAL DEMONSTRATION TENT

See the Program page 7-8 for a schedule of Technical Demonstrations.

30. CAES WEATHER STATION

We are a participant in the National Oceanic and Atmospheric Administration's (NOAA) Cooperative Weather Observer Network. It is the nation's largest and oldest weather network. We have been making observations since 1936. The network was established under the Organic Act of 1890 to formalize the collection of meteorological observations and establish/record climate conditions in the United States – primarily for agricultural purposes. Many people recorded weather observations long before that time. John Campanius Holm's 1644-45 weather records, for example, are the earliest known climate records in the United States. Subsequently, many others –including George Washington, Thomas Jefferson, and Benjamin Franklin, also maintained weather records. Today, more than 11,000 Cooperative Weather Observations across the United States donate more than one million hours each year to collect daily hydro-meteorological data. The network of 11,000 volunteer weather observers are located at non-airport locations where people live, work, play and grow their food (i.e. locations include urban, suburban and rural areas, farms, mountaintops, national state and local park settings).

31. INVASIVE ALIEN INSECTS IN CONNECTICUT

C. Maier *Assisted by* T. Zarrillo, M. Lowry, E. Bulger, and K. O'Donnell

Invasive alien insects have a significant negative impact upon the economy and the biodiversity of Connecticut. Annually, agencies, such as the Connecticut Agricultural Experiment Station and the United States Department of Agriculture, conduct surveys to detect new foreign insects and to determine the distributional range of established ones. Early detection, in particular, greatly decreases the cost of coping with alien invaders. The cost of non-native insects can be reduced even further by conducting research on their behavior and ecology to develop effective strategies to eradicate them or to slow their spread. Investigations this year have focused on the honeysuckle borer, the lily leaf beetle, and the viburnum leaf beetle.

32. COMPOSTING LEAVES USING THE STATIC PILE METHOD

A. Maynard and D. Hill *Assisted by* H. Neckerman

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.

33. NANOPARTICLE TOXICITY TO AGRICULTURAL PLANTS

C. Musante and J. White *Assisted by* J. Hawthorne.

Nanomaterials (NM) have at least one dimension less than 100 nanometers (one billionth of a meter) and this small size results in unique properties not observed with equivalent bulk particles. 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 1000-NM containing products are commercially available in areas such as electronics, health-care, cosmetics, pharmaceuticals, and food processing. We specifically note the recent and increasing use of nanomaterials in agriculture, including pesticides and fertilizers directly applied to food crops. We have begun a research project that will characterize the impact of NMs on common agricultural crops, eventually focusing on potential risk posed to humans from exposure to these materials. Our data suggest that exposure to nanoparticle silver, copper, and multiwalled carbon nanotubes negatively impacts agricultural plants and that this effect is greater than observed with equivalent bulk materials.

34. PHYTOREMEDIATION: USING PLANTS TO CLEAN CONTAMINATED SOIL

J. White *Assisted by* T. Arsenault, W. Berger, and J. Hawthorne.

Phytoremediation is a novel technique in which plants are used to remove inorganic and organic pollutants from contaminated soils and sediments. The plant species used depends very much on the pollutant. Some effective plants have been found for heavy metals such as arsenic and cadmium, as well as for organic solvents such as trichloroethylene. Persistent organic pollutants (POPs) such as DDT/DDE and PCBs are much more problematic. Phytoremediation research at CAES has focused on developing a plant-based remedial approach for these and other recalcitrant organic contaminants. The current experiments are evaluating hybrid crosses of cucurbits (zucchini and pumpkin) known to accumulate weathered DDE and chlordane (in roots and stems) with closely related plants known not to take up the pollutant.

35. NUT ORCHARD

S. Anagnostakis *Assisted by* P. Sletten

This orchard of grafted nut trees was planted by Richard Jaynes in the spring of 1981. There are several named cultivars of chestnut and other nut trees included. Last year and this year, we planted several new nut cultivars that we want to test for their production potential in Connecticut.

36. VERIZON TELEPHONE TRANSMISSION SILO

Learn about the cellular transmission tower.

37. MOSQUITO TRAPPING AND TESTING PROGRAM FOR WEST NILE AND EASTERN EQUINE ENCEPHALITIS VIRUSES

T. Andreadis, P. Armstrong, and G. Molaei *Assisted by:* J. Shepard, M. Thomas, S. Finan, G. Barmettler, E. Baisden, W. Barozi, C. Bond, A. Brush, E. Calandrella, E. Frank, D. Lazo, W. Magin, L. Meany, C. Ngo, C. Remick, and M. Spinella.

West Nile and Eastern Equine Encephalitis viruses are firmly established in Connecticut and continue to be significant public health and veterinary threats with annual re-emergence throughout the state. The surveillance and research activities undertaken by The Connecticut Agricultural Experiment Station are integral to the public health response to these mosquito-borne viruses in Connecticut and have provided critical information on the epidemiology of the viruses and the ecology of the mosquito vectors in the northeastern US. This information is used by the State Department of Public Health in the issuance of health alerts and to direct preemptive and emergency mosquito control activities by the State Department of Environmental Protection. Trapping is conducted daily from June through October at 91 locations statewide. The objectives of the program are to provide: 1) early evidence of local virus activity; 2) information on the abundance, distribution, identity and infection rates of potential mosquito vectors; 3) data that are used to assess the threat of WNV and EEE to the public and; 4.) guide the implementation of mosquito control measures. Since 1996, staff members at The Connecticut Agricultural Experiment Station have trapped and tested over 2 million mosquitoes. A total of 782 isolations of WNV have been made from 21 different species of mosquitoes, and a total of 324 isolations of EEE have been made from 18 species of mosquitoes. The principal foci of WNV activity in Connecticut have been identified as densely populated residential communities in coastal Fairfield and New Haven Counties. The principal foci for EEE activity are in more rural locales located in the southeastern corner of the state. We have observed a correlation both temporally and spatially between the isolation of WNV and EEE from field-collected mosquitoes and the elevated risk of human infection that typically extends from late July through September in Connecticut.

38. LIFE IN THE SOIL

C. Vossbrinck

The soil ecosystem is filled with a large number of different types of animals, fungi, protozoa and bacteria. The animals include the relatively large earthworms, as well as insects and insect larvae, spiders, mites, tiny nematodes, waterbears and the numerous parasites that feed upon them. Life in the soil is different indeed. The soil crumb space is used as an important place to hide from predators. In addition, the soil also contains fungi that are adapted to catch and feed upon the tiny nematodes. The fungi and bacteria are also responsible for breaking down leaf litter. A single footprint in the forest or on the grass may cover several tiny spiders, 25 insects, 100 mites, 1,000 nematodes, millions of fungi and hundreds of billions of bacteria. All of these creatures have amazing adaptations to life in the changing conditions of the soil; they can withstand the dryness and come to life, grow and multiply and move about when it rains. In addition, they each have their own parasites which live in and on them and their diseases have diseases. It's truly an amazing world.

39. THE FARMER'S COW
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[1]. 51 percent of Connecticut farmland is in dairy or dairy support. In 2003, there were 191 dairy farms remaining in Connecticut[2]. 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.

40. EXPERIMENT STATION ASSOCIATES
Information is available on this organization formed to help promote scientific advances at The Connecticut Agricultural Experiment Station.

41. IDENTIFICATION OF COMMON GARDEN PESTS
H. Smith
Insects and mites commonly attacking vegetables and ornamental plants in Connecticut will be displayed, as will beneficial insects. Visitors will have the opportunity to examine insects under a microscope, and receive information on pest management.

42. OILSEED CROPS FOR BIOLOGICAL CONTROL OF SOILBORNE PATHOGENS'
J. LaMondia *Assisted by* M. Salvas
Biofumigation results from the incorporation and decomposition of plant residues which release chemicals that kill pests or pathogens in soils. Brassica crops contain chemicals called glucosinolates that can decompose to a number of different metabolites that can be effective against pathogens. We are investigating the effects of different Brassica seed meals (the seed remaining after oil extraction) with different glucosinolate content on pests such as plant parasitic nematodes and fungi using bioassays. In addition to biofumigation, Brassica crops can be used to produce oil for biodiesel and seed meals for organic fertilizers.

43. COMMON INDOOR MOLDS
D. Li
Indoor molds often develop as a result of water damage or dampness occurred in buildings and residences. The presence of indoor molds will diminish indoor air quality by releasing fungal spores into the air and subsequently have detrimental effects on the health of residents. Over six hundred of molds have been found in indoor environments in North America. Among these molds, *Cladosporium* spp., *Alternaria* spp., *Aspergillus* spp., *Penicillium* spp. *Epicoccum nigrum*, *Acremonium* spp., *Paecilomyces* variotii, *Mucor* spp., *Phoma* spp., *Stachybotrys chartarum*, *Chaetomium globosum*, and *Ulocladium* spp. are common in indoor environments.

44. LYME DISEASE IN TICKS FROM CONNECTICUT CITIZENS
J. Anderson *Assisted by* B. Hamid, E. Alves, and B. Crowley
In 2009, 3672 black-legged (deer) ticks (*Ixodes scapularis*) were received, as well as 285 American dog ticks (*Dermacentor variabilis*) and 63 lone star ticks (*Amblyomma americanum*). Of the tested black-legged ticks, 38% (666 of 1,768) were infected with the Lyme disease organism, *Borrelia burgdorferi*. The average time between receipt of a tick and reporting on the tick to the senders was 12.2 days.

All ticks submitted by municipal health departments are identified to species and degree of engorgement, but only deer ticks that have fed on blood are tested for the presence of the Lyme disease bacterium. Studies by other researchers have shown that ticks without blood in their midgut do not transmit the Lyme disease-causing organisms.

45. THE "DEER" TICK *IXODES SCAPULARIS*
K. Stafford *Assisted by* A. Bharadwaj, H. Stuber, and L. Colligan
The blacklegged tick or "deer" tick *Ixodes scapularis* transmits the agents of Lyme disease, human babesiosis, and human granulocytic anaplasmosis in Connecticut. Observe live and preserved ticks under the microscope. Lyme disease is still an important public health concern in Connecticut with 4,156 reported human cases in 2009, an increase of 6% over 2008. Copies of the Tick Management Handbook are available.

46. NATURAL PRODUCTS FOR THE CONTROL OF THE TICK *IXODES SCAPULARIS*
A. Bharadwaj and K. Stafford *Assisted by* H. Stuber, and L. Colligan
We continued field experiments with garlic and different formulations of the cedar and grapefruit essential oil nootkatone at actual home sites this summer to further determine the efficacy of natural compounds for tick control. Both these materials can provide relatively good reductions in tick activity, but may require more frequent applications than synthetic chemical pesticides.

47. SEASONAL PREVALENCE OF ANTIBODIES TO TICK-TRANSMITTED PATHOGENS IN DEER
L. Magnarelli, S. Williams, and E. Fikrig (Yale University) *Assisted by* T. Blevins
Whole-blood samples were obtained from white-tailed deer, representing 44 sites in Connecticut, and tested for antibodies to infectious bacteria that cause Lyme disease and granulocytic anaplasmosis. Deer are heavily parasitized by blacklegged ticks, which transmit one or more disease organisms to these animals, people, domesticated animals, birds or other vertebrate hosts. More than 55% of the 224 deer sera analyzed had antibodies to either or both pathogens during different seasons and throughout the 11-year study. There was coexistence of antibodies to both disease organisms in 72 (32%) sera. These results show that there are numerous tick-infested sites where these infectious agents persist, and since deer are frequently parasitized by blacklegged ticks and produce high concentrations of antibodies, these animals are suitable for monitoring the presence of these pathogens in communities.

48. EFFECTIVENESS OF DEER REPELLENTS IN CONNECTICUT
S. Williams and J. Ward *Assisted by* M. Short and M. Chassey
Browsing by overabundant herds of white-tailed deer (*Odocoileus virginianus*) can cause significant economic damage to agricultural crops and landscape plantings. In many instances, commercially available repellents may be an appealing alternative to physical exclusion of animals for both commercial growers and homeowners. We tested 10 different commercially available repellents (Chew-Not®, Deer Off®, Deer-Away® Big Game Repellent, Plantskydd®, Bobbex®, Liquid Fence®, Deer Solution®, Hinder®, Repellex® systemic tablets, and coyote urine) on yews (*Taxus cuspidata* 'Densiformis') at two different locations in Connecticut. The study included both positive (fence) and negative (no treatment) controls in a 2-block formation. Each group within each block was randomly assigned one of the 12 treatments. Repellents were applied based on manufacturers' label recommendations for the 2006 and 2007 growing seasons and application costs were recorded. A Protection Index was derived based on plant size and dry needle weights at the end of the 2007 growing season. In general, repellents that required more frequent application performed better. Bobbex® ranked highest, but was the most expensive repellent treatment. Hinder® performed nearly as well at a fraction of the cost. Yews protected by Repellex®, Deer Solution®, coyote urine, and Plantskydd® were the same size as unprotected controls at both sites and did not have significantly more needles. Repellents alone cannot prevent 100% of browse damage and the choice of repellent usage is a trade-off between effectiveness, costs, ability to follow recommended reapplication interval, and crop/plant to be protected.

49. THE JAPANESE BARBERRY MICROCLIMATE ENHANCES BLACKLEGGED TICK SURVIVAL
S. Williams and J. Ward *Assisted by* M. Short and M. Chassey
Japanese barberry (*Berberis thunbergii*) is a thorny, perennial, exotic, invasive shrub that is well established throughout much of the eastern United States. It can form dense thickets that limit native herbaceous and woody regeneration, alter soil structure and function, and harbor increased blacklegged tick (*Ixodes scapularis*) abundance. This study examined a potential causal mechanism for the link between Japanese barberry and blacklegged ticks to determine if eliminating Japanese barberry could reduce tick abundance and associated prevalence of *Borrelia burgdorferi*. Japanese barberry was controlled using different techniques at five study areas throughout Connecticut where adult ticks were sampled over three years. Each study area had three habitat plots: areas where barberry was controlled, areas where barberry remained intact, and areas where

barberry was minimal or absent. Sampled ticks were retained and tested for *B. burgdorferi* by indirect fluorescent staining methods. At two study areas, temperature and relative humidity data loggers were deployed in each of the three habitat plots over two growing seasons. Intact barberry stands had 113 *B. burgdorferi*-infected adult ticks/acre which was significantly higher than for controlled (49/acre) and no barberry (12/acre) areas. Microclimatic conditions where Japanese barberry was controlled were similar to areas without barberry. Japanese barberry infestations are favorable habitat for ticks, as it provides a buffered microclimate that limits desiccation-induced tick mortality. Control of Japanese barberry reduced the number of ticks infected with *B. burgdorferi* by nearly 60% by reverting microclimatic conditions to those more typical of native northeastern forests.

50. DEMONSTRATION OF JAPANESE BARBERRY CONTROL METHODS

J.P. Barsky, J. Ward and S. Williams

Japanese barberry (*Berberis thunbergii* DC.) has been recognized in North America for 135 years, and promoted as an ornamental for the last 90 years. It is perhaps the most well-known, exotic invasive plant in Connecticut, having long since escaped cultivation, causing economic and environmental harm to our forest resources. It forms dense thickets that inhibit native plant regeneration, and alters soil biota and structure. In addition, it serves as part of a positive feedback mechanism in maintaining high populations of blacklegged ticks, which transmit the causal agent of Lyme disease, *Borrelia burgdorferi*. Hence, it inadvertently has negative impacts on human health. In an effort to combat the spread of Japanese Barberry in our forests, research studies were initiated in 2007, focusing on developing alternative approaches to controlling Japanese Barberry infestations. Four methods of control are presented: use of a weed wrenching tool, application of herbicide via brushsaw, foliar application of herbicide, and a backpack-mounted propane torch.

51. INVASIVE AQUATIC PLANT PROGRAM

G. Bugbee

Connecticut lakes and ponds face an imminent threat from non-native invasive plants. Recently introduced plants such as Eurasian milfoil, variable milfoil and fanwort are of great concern. Their dense stands often reach the surface and interfere with recreational uses. Invasive species drastically alter native ecosystems leading to the decline in native plants, fish and other beneficial organisms. Researchers, in the Department of Environmental Sciences, are documenting our states invasive aquatic plant problem and studying management options. We are continuing a statewide inventory of freshwater aquatic vegetation. From 2004 - 2009, the invasive and native plants in 162 lakes and ponds were surveyed and mapped. We documented over 100 plant species with 13 of them being invasive. Approximately two-thirds of the water bodies contained one or more invasive species. Requests for station assistance in managing unwanted aquatic vegetation are common. A search is underway to discover novel ways to control invasive aquatic plants. These include reduced risk herbicides and biological agents such as the Eurasian water milfoil weevil and grass carp. At this plot, you will see our aquatic plant surveillance and control boat and underwater video equipment. A researcher will be available to discuss our program and answer questions about lakes and ponds.

52. USING LEAF COMPOST IN HOME GARDENS

A. Maynard and D. Hill *Assisted by* H. Neckerman

Annual amendment of soil with leaf compost prevents compacting and crusting of the soil surface and promotes root growth and infiltration of rain. In these plots, the addition of 1-inch of leaf compost annually since 1982 increased organic matter from 5.9 to 12.6%. Increased root growth in the amended soil allows plants to utilize nutrients in a greater volume of soil than plants in untreated soil of greater density. We are measuring the effect of reduced rates of fertilization (2/3, 1/3, 0 of normal rates) and compost amendments on the yields of several vegetables by comparing them with yields from unamended controls. We are also measuring the nutrient status of the soils in each plot throughout the growing season. Each year since 1982, yields on the leaf compost amended plots fertilized at 2/3 and 1/3 the normal rate have been consistently greater than on unamended plots with full fertilization.

53. A VEGETABLE GARDEN FROM 100 YEARS AGO

A. Maynard, D. Hill, F. Ferrandino, and K. Stoner *Assisted by* W. Ryan and H. Neckerman

At the time of our first Plant Science Day 100 years ago, what would a vegetable garden look like? Here is a vegetable and herb garden consisting of varieties that were available 100 years ago. As you stroll around the garden, you will be surprised that many plants are still popular today. We also have utilized the ancient Native American technique of growing corn, beans, and squash together in an arrangement called the Three Sisters. Corn acts as a support for climbing bean vines, the beans fix nitrogen in the soil, and the squash spreads on the ground providing a living mulch.

54. GIRLS SCOUTS OF CONNECTICUT

T. Arsenault

Established on March 12, 1912 by Juliette Gordon Low, the mission of Girl Scouts is to build girls of courage, confidence, and character, who make the world a better place. Today, there are 3.6 million Girl Scouts, consisting of 2.7 million girls and 928,000 adult members. In Girl Scouts, girls discover the fun, friendship, and power of girls together. Through a myriad of enriching experiences, such as extraordinary field trips, sports skill-building clinics, community service projects, cultural exchanges, and environmental stewardships, girls grow courageous and strong. For more information contact our local Girl Scout council at http://www.gsofct.org/.

55. CONNECTICUT CHAPTER OF THE SOCIETY OF AMERICAN FORESTERS

J. Nurenburg

The Society of American Foresters (SAF) is the national scientific and educational organization representing the forestry profession in the United States. Founded in 1900 by Gifford Pinchot, it is the largest professional society for foresters in the world. The mission of the Society of American Foresters is to advance the science, education, technology, and practice of forestry; to enhance the competency of its members; to establish professional excellence; and, to use the knowledge, skills, and conservation ethic of the profession to ensure the continued health and use of forest ecosystems and the present and future availability of forest resources to benefit society. SAF is a nonprofit organization meeting the requirements of 501 (c)(3). SAF members include natural resource professionals in public and private settings, researchers, CEOs, administrators, educators, and students. www.safnet.org.

56. USDA, NATIONAL AGRICULTURAL STATISTICS SERVICE, NEW ENGLAND FIELD OFFICE

G. 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 46 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.usda.gov/nass while the homepages for New England and each of the six states are at http://www.nass.usda.gov/Neng (CT, NH, ME, MA, RI, VT).

57. CONNECTICUT TREE PROTECTIVE ASSOCIATION

C. Donnelly

CTPA is a non-profit, non-partisan association, made up largely of tree care professionals from Connecticut. CTPA promotes the protection and care of trees in Connecticut, and encourages the ongoing improvement of tree care practices among tree workers. www.ctpa.org.

58. CONNECTICUT FARMLAND TRUST

K. Matus

The Connecticut Farmland Trust (CFT), established in 2002, is a statewide private non-profit conservation organization dedicated to protecting Connecticut's farmland. CFT's mission is to: 1.) Protect Connecticut's prime farmland for agricultural use by acquiring agricultural conservation easements and farmland; 2.) Assist landowners, local land trusts, town officials, and state agencies in identifying and protecting threatened agricultural land; and 3.) Enhance agricultural diversity, agricultural economic development, environmental quality, and rural character. The Connecticut Farmland Trust accepts donations of farmland and agricultural conservation easements as well as purchases farmland and agricultural conservation easements. In its first three years, CFT has protected 7 active farms, totaling more than 675 acres. For more information about CFT or options for protecting farmland, please contact Elisabeth Moore, Director of Projects, Connecticut Farmland Trust, 77 Buckingham Street, Hartford, CT 06106, phone: 860-247-0202, fax: 860-247-0236, email: emoore@ctfarm.org website: www.ctfarmland.org.

59. CONNECTICUT DEPARTMENT OF AGRICULTURE
R. Olsen
A photo exhibit will highlight Connecticut agriculture. Brochures and pamphlets will be available, along with information on Farm Reinvestment Program grants, Public Act 490 and farming, and agriculture and taxes. www.ct.gov/doag.

60. CONNECTICUT PROFESSIONAL TIMBER PRODUCERS ASSOCIATION
J. Nichols
The Connecticut Professional Timber Producers Association, Inc. (CTPTPA) was formed in 2007 from the old Connecticut Wood Producers Association (Woodpac) of the 1970s. The mission of CTPTPA is to address the growing need for an organization to represent the vital interests of the harvesters and sawmills of Connecticut, to promote the use of Connecticut's renewable forest resources, and to enhance the image of the Connecticut forest products industry throughout the state by way of the following activities: A. Communicate information to the membership; B. Institute ethical guidelines and demand a high degree of professional ethics among its members. Establish Forest Practice Standards for the timber harvesting and forest products profession; C. Promote safety within the profession; D. Promote Best Management Practices (also known as BMP's) for the timber harvesting profession; E. Promote education in the fields of forestry, timber harvesting, and forest products both within the Association and outside; F. Promote superior utilization of forest products; G. Promote the use of Connecticut wood products; and H. Publish a Connecticut Forest Profession directory and publish periodically an industry newsletter. www.timproct.org.

61. CONNECTICUT FARM BUREAU ASSOCIATION
C. Melmer
Farm Bureau is a non-governmental, voluntary organization of farm families united to find solutions for concerns facing production agriculture in our counties, state and nation. Connecticut Farm Bureau provides farmers with a strong clear voice in state and national issues. Volunteer leaders and staff work closely with state and federal regulatory agencies and elected officials on issues ranging from economic viability, property rights, taxation, land use planning to labor laws and farmland preservation. One of our goals 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. www.cfba.org.

62. CONNECTICUT GREEN INDUSTRIES
B. Heffernan
The Connecticut Green Industries represents The Connecticut Greenhouse Growers Association (CGGA) and The Connecticut Nursery and Landscape Association (CNLA). CGGA is the trade association for Connecticut's great Greenhouse Industry, representing nearly 200 growers of potted plants. http://www.flowersplantsinct.com/cgga/cggaindex.htm. CNLA is Connecticut's Trade Association for Growers of Trees, Shrubs, Perennial-Annual Flowers, and Nurseries, Garden Centers, Landscapers and Landscape designers. http://www.flowersplantsinct.com/cnla/cnlaindex.htm.

63. CONNECTICUT GROUNDSKEEPERS ASSOCIATION and CONNECTICUT ENVIRONMENTAL COUNCIL
E. Fearn
The Connecticut Grounds Keepers Association provides members with exceptional educational programming, provides a medium for exchanging ideas and through advocacy, shapes positions and view points that impact the green industry and the environment. The Connecticut Environmental Council is a coalition of business owners, organizations and individuals that promote and maintain high standards of public service and conduct in the professional pesticide application industry.

64. THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION: DIVISION OF FORESTRY
C. Donnelly
The CT Department of Environmental Protection Division of Forestry performs a range of services for the citizens of Connecticut, who live in a state that is 60 percent forested. Among its responsibilities, DEP Forestry manages nearly 162,000 acres of state-owned forestlands for the health and diversity of the forest and the benefit of those who live in Connecticut. We also work with private forestland owners, who own 1.54 million acres of forest, and municipalities on matters relating to proper forest management, forest health, wildland fire control, the certification of forestry professionals and general technical support and outreach regarding CT’s 1.86 million total acres of forest.
At Plant Science Day, the DEP 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 its efforts on certification of forestry professionals and the quality of work performed

on forestlands throughout the state. Questions regarding forests, trees, and forest and tree professionals are all fair game for this group.

65. UNIVERSITY OF CONNECTICUT MASTER GARDENERS

J. Hsiang

The Master Gardener Program is an Educational Outreach Program that is part of the University of Connecticut Cooperative Extension System. The program started in 1978 and consists of horticulture training and an outreach component that focus on the community at large. Master Gardeners are enthusiastic, willing to learn and share their knowledge and training with others. What sets them apart from other home gardeners is their special horticultural training. In exchange for this training, Master Gardeners commit time as volunteers working through their local Cooperative Extension Center and the Bartlett Arboretum in Stamford to provide horticultural-related information to the community.

66. CONNECTICUT NORTHEAST ORGANIC FARMING ASSOCIATION

D. 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. http://www.ctnofa.org/.

67. USDA, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, PLANT PROTECTION AND QUARANTINE

E. Chamberlain

The mission of Plant Protection and Quarantine: APHIS-PPQ safeguards agriculture and natural resources from the risks associated with 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.

68. USDA NATURAL RESOURCES CONSERVATION SERVICE

C. Donzella

The Natural Resources Conservation Service (NRCS) is an agency of the United States Department of Agriculture. For nearly 70 years, we have worked cooperatively with landowners, conservation districts, federal, state, and local governments, and citizens from urban and rural communities to restore and enhance the landscape. NRCS soil conservationists, soil scientists, agronomists, ecologists, engineers, planners, and other specialists promote land stewardship by providing technical assistance through teams to address surface and groundwater quality; wetlands, riparian areas, and biodiversity; aquatic and terrestrial habitat; and impacts of landuse changes. NRCS teams work on all of Connecticut's landscapes: agricultural, wetlands and riparian areas, suburban, rural, urban centers, and forested. http://www.ct.nrcs.usda.gov

69. UNITED STATES DEPARTMENT OF LABOR / OSHA

L. May

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 office is located in Bridgeport, CT. Our phone number is 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.

70. CONNECTICUT INVASIVE PLANT WORKING GROUP

D. Ellis

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 non-invasive ornamental alternatives throughout Connecticut and work cooperatively with researchers, conservation organizations, government agencies, the green industries, and the general public to identify and manage invasive species pro-actively and effectively. The CIPWG website, www.hort.uconn.edu/cipwg provides timely information on non-native invasive plants, including a list of Connecticut invasive species, management information, invasive plant alerts, fact sheets, invasive plant legislation, photos, and a calendar of events. For additional information, or to join the CIPWG electronic mailing list, contact Donna Ellis 860-486-6448; email donna.ellis@uconn.edu.

71. MEASURING PESTICIDES IN SQUASH POLLEN AND NECTAR
K. Stoner and B. Eitzer *Assisted by* T. Zarrillo and M. Lowry
The health of honey bees and other pollinators has been a great concern in recent years. Transfer of pollen by insects is essential for reproduction in 90% of all flowering plants, including most fruits and vegetables. When we use insecticides in a plant like squash, which requires multiple visits from pollinators to each female flower that will set fruit, we need to make sure that we are not harming the pollinators essential to crop production. In this plot, we applied two insecticides, imidacloprid and thiamethoxam, both of which travel systemically throughout the plant, to the soil, either by spraying the seed furrow or through drip irrigation. We are measuring the amount of insecticide found in the pollen and nectar of the treated plants. This is the second year of this experiment, and the insecticides were found in both pollen and nectar last year.

72. SUPPRESSION OF FOLIAR DISEASES OF ZINNIAS
W. Elmer *Assisted by* P. Thiel
Zinnias routinely get foliar diseases. Powdery mildew and bacterial leaf spot are the most common. These plots were established to examine the effect of several environmentally friendly products for their effect on disease suppression.

73. INDUCING FUSARIUM DISEASE RESISTANCE IN GLADIOLUS
W. Elmer *Assisted by* P. Thiel
Fusarium corm rot of gladiolus is found wherever gladioli are grown. Specific strains of a soil fungus called *Fusarium* cause the disease. Corms that were treated last year with increasing rates of a chemical called Actigard were dug and overwintered. This chemical induces plants to become more resistant to disease. These plots are designed to determine whether or not the chemical has residual activity and can suppress the disease the following year.

74. EASTERN BLUEBIRD *SIALIA SIALIS* NEST BOX TRAIL
L. Kaczenski
A Bluebird trail consists of a minimum of 6 nesting boxes spaced a hundred yards or more apart. Here at Lockwood Farm, we have 16 nesting boxes located along the fencing beginning at the entrance of the cottage, along the Christmas tree farm, the vineyard then across the farm between the orchard and the weather station. Success of a trail greatly depends on weekly monitoring of the nesting boxes; close monitoring is needed to prevent House Sparrows from nesting in them. House Sparrows and the European Starling are a non-native invasive species introduced to North America in the 1800's; both of which are cavity nesters and both are very aggressive and have contributed greatly to the decline of Bluebirds. There is also nesting competition with Tree Swallows, House Wrens, Tufted Titmice and Chickadees. The population decrease of the Eastern Bluebird declined seriously enough to reach a critical status by the mid 1900's due to habitat destruction, over use of pesticides and nest predation by the House Sparrow and Starling. Bluebird trails across North America have greatly increased their numbers and due to this increase they are not protected under the U.S. Endangered Species Act. This trail is registered with The Birdhouse Network; the data collected during the weekly monitoring (inhabitants, clutch size, predation, successful fledging, etc.) are submitted to the Cornell Laboratory of Ornithology helping scientists' with their research of the Eastern Bluebird.

75. BIRD AND BUTTERFLY GARDEN
J. Canepa-Morrison *Assisted by* J. Fengler
The Bird and Butterfly Garden is a partnership of The Connecticut Agricultural Experiment Station and the Federated Garden Clubs of CT/Spring Glen Garden Club. This 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? The Experiment Station 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.

76. NATIVE WOODY SHRUBS
J. Ward *Assisted by* J.P. Barsky
Native woody shrubs offer an alternative to exotics commonly used in landscaping. This collection of shrubs was assembled in 1962, and in 1976, it was arranged in its present form with a dry site on the gravel mound and moist site in the shallow,

plastic-lined depression. Many of these shrubs flower in the spring; their flowers can be seen in the photographs. Others, such as sweet pepperbush, spirea, and buttonbush, flower in summer. Witch-hazel 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.

77. BEES, TREES, AND COMMODITIES: THE SURVEY AND INSPECTION TEAM

V. Smith, T. Blevins, J. Fengler, I. Kettle, S. Sandrey, and P. Trenchard

Our personnel uphold state laws enacted to protect Connecticut's vegetation from injurious insects and diseases. Each year we inspect 8,500 acres of nursery stock grown in over 300 nurseries for insects and diseases. When problems are found, control remedies are suggested. We inspect agricultural products to be shipped to foreign or interstate destinations, and we survey Connecticut's woodlands to find troublesome pests such as the gypsy moth, forest tent caterpillar, and the hemlock wooly adelgid, and diseases such as anthracnose and Septoria leaf spot. Examples of insect pests and plant diseases are exhibited. Insect survey maps are shown. Connecticut has over 500 beekeepers tending over 3,600 colonies of honey bees. A task of the Experiment Station is to seek out and eliminate contagious bee diseases and parasitic mites. There will be displays of insects that attack ornamentals, live honey bees, a beehive and various beekeeping equipment, as well as wasps and hornets and their nests. Forest Health Highlights will be available as handouts to the public.

78. *CERCERIS FUMIPENNIS*, THE BEETLE HUNTING WASP

C. Rutledge *assisted by* M. Scott

A major challenge to the effective management of wood-boring insects has been the difficulty of detecting them. In particular, the Emerald Ash Borer (EAB), an invasive beetle in the family Buprestidae that attacks and kills native, healthy ash trees is often in an area 4-6 years before it is discovered. It was discovered in Detroit in 2002, and probably came over from its native Asia in solid-wood packing material at the port. It is rapidly spreading across the country and has been discovered in 13 states and 2 Canadian provinces. Other non-native beetles in family Buprestidae are also considered high-risk for accidental introduction. Recently a novel approach to surveying for EAB and its relatives has been developed. The native, solitary wasp, *C. fumipennis*, feeds its offspring adult buprestid beetles. If EAB is in the area, it will be among the prey taken by the wasps. By watching which beetles are brought back to the nest, we can determine whether or not EAB, or any other invasive buprestid, is in the area.

79. CONNECTICUT NURSERYMEN'S GARDEN

The Connecticut Nurserymen's Gardens are showcases of plants discovered or hybridized and introduced to the horticultural trade by Connecticut nurserymen. Similar gardens are at the Valley Laboratory in Windsor and the Main Laboratories in New Haven. All plants were donated by members of the Connecticut Nurserymen's Association and planted in 1986-87. Introductions feature evergreen and deciduous azaleas, mountain laurel, maple, pine, hosta, iris, and other flowering and foliage plants. A brochure containing maps of all three gardens and a brief description of the plants are available.

80. CHESTNUT SPECIES AND HYBRIDS

S. Anagnostakis *Assisted by* P. Sletten

These trees are a part of the large collection of species and hybrids of chestnut maintained by The Connecticut Agricultural Experiment Station. Great differences can be seen in chestnut blight resistance, form, and nut production. Hypovirulent strains of the blight fungus help protect them from lethal cankers (see CONTROL OF BLIGHT ON AMERICAN CHESTNUTS plot 24). Plants of all seven species of chestnut are growing here. In 1994, two seedlings from the Caucasus Mountains of Russia that are true European chestnut were planted, but only one has survived our Connecticut winters. European chestnut trees from 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 cultivar 'Lockwood' is at the southwest corner of the plot.

81. DENSE PLANTING OF AMERICAN CHESTNUTS

S. Anagnostakis *Assisted by* P. Sletten

In 1982, 300 seedling American chestnut trees from Michigan were planted in two dense plots. We treated the north plot with hypovirulence for blight control (see CONTROL OF BLIGHT ON AMERICAN CHESTNUTS plot 24), and it looks slightly better than the south plot.

82. DWARF HYBRID CHESTNUT TREES

S. Anagnostakis *Assisted by* P. Sletten

These hybrid trees are the results of crosses done in 1934 by Arthur Graves followed by intercrossing by Hans Nienstadt in 1951 and selection by Richard Jaynes from 1970 to 1973. One of the parents in the hybrids was the dwarf species *Castanea seguinii*, and the selected trees that remain produce abundant nut crops and have remained small. These are important parents in our selections of orchard-type trees for Connecticut. The cultivar 'Little Giant' was released to the nursery industry in 1999, 'Hope' in 2003, and 'King Arthur' in 2005 (see signs). New hybrid and species trees are planted next to these dwarf hybrids.

83. OZARK CHINQUAPIN TREES
S. Anagnostakis *Assisted by* P. Sletten
Ozark chinquapins are *Castanea ozarkensis*, native to the Ozark Plateau in Arkansas and Oklahoma. They are now threatened by chestnut blight disease, fires, and land use changes in their native habitat. These are timber trees, unlike the shrub-like Allegheny chinquapins in the east (there is one in the CHESTNUT SPECIES AND HYBRIDS plot 80). We have been checking this collection of seedlings from the Ouachita National Forest for resistance to blight, and using them as female parents in crosses to produce Ozark chinquapins with more resistance to blight.

84. ROCKY HILL AMERICAN CHESTNUT TREES
S. Anagnostakis *Assisted by* P. Sletten
Seed collected from selected American chestnut trees in Rocky Hill in 1985 grew into the trees planted here. They are used as female parents in our crosses and are being treated with hypovirulence (see CONTROL OF BLIGHT ON AMERICAN CHESTNUTS plot 24) to keep them alive.

85. PINOT GRIS CULTURAL TRIALS
W. Nail *Assisted by* H. Neckerman
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. Beginning in 2007, comparisons between fruit zone leaf removal on both sides and only on the east side were done.

86. HYBRID AND VINIFERA WINEGRAPE CULTIVAR TRIAL
W. Nail *Assisted by* H. Neckerman
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 second largest NE-1020 planting in the eastern states. Another, smaller, cultivar evaluation plot has been established at the Windsor station.

87. BIOLOGICAL CONTROL FOR BACTERIAL SPOT OF PEACHES
R. Marra
Peaches are a high-value crop grown in Connecticut primarily for fresh market, as part of a diversified orchard plan. "Bacterial spot," caused by the bacterium, *Xanthomonas arboricola* pathovar *pruni*, is one of the most difficult diseases for peach growers to manage. As part of an effort to promote an environmentally friendly and sustainable disease management strategy, we are exploring the potential for a biological control method, using a bacterial virus (known as *bacteriophage*, or *phage*) naturally associated with this bacterium to protect plants from infection and reduce the severity of the disease.

88. BEACH PLUM TRIALS
A. Maynard and D. Hill *Assisted by* H. Neckerman
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 in 35 sites from Maine to Delaware. The trees are evaluated annually and select elite individuals will be propagated as possible cultivars in the future.

89. JAPANESE PLUM VARIETY TRIALS

A. Maynard and D. Hill *Assisted by* H. Neckerman

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, with the exception of the cultivar Obilnaja, have been damaged by black knot disease.

90. HYBRID ELM TREES

S. Anagnostakis *Assisted by* P. 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.

Index of Scientists' Names and their Field Plot Numbers

Scientist's Name	Field Plot Number (bold type indicates primary location)
Anagnostakis, S.	1, 10, 19, **24, 25, 26, 27**, 35, 80, 81, 82, 83, 84, 90, **Main Tent**
Anderson, J.	**44**
Andreadis, T.	**37**
Armstrong, P.	**37**
Bharadwaj, A.	**46**
Bugbee, G.	**51, Technical Demonstration Tent**
Cheah, C.	**15, Technical Demonstration Tent**
Cowles, R.	**16**
Dingman, D.	**Technical Demonstration Tent**
Douglas, S.	**Main Tent, Barn B**
Eitzer, B.	**Barn B**
Elmer, W.	11, **72**, 73
Ferrandino, F.	**13, 14**
Gent, M.	**12**
Hamid, B.	**44**
Hill, D.	**2, 3, 4, 5, 6, 7**, 8, 9, 17, 32, 52, 53, 88, 89, **Barn B**
Hiskes, R.	**28**
Inman, M.	**28**
Krol, W.	**Barn B**
LaMondia, J.	**42**
Li, D.	**43**
Li, Y.	**28**
Magnarelli, L.	47, **Main Tent**
Maier, C.	**31**
Marra, R.	87, **Walking Tour, Pesticide Credit Tour**
Maynard, A.	**2, 3, 4, 5, 6, 7**, 8, 9, 17, 32, 52, 53, 88, 89, **Barn B**
McHale, N.	**Bus Tour, Barn B**
Mervosh, T.	**28, Technical Demonstration Tent**
Molaei, G.	**37**
Musante, C.	**33**
Nail, W.	**20, 21, 22**, 85, 86
Peterson, R	**Bus Tour**
Pignatello, J.	**23**
Ridge, G.	**28**
Robb, C.	**Barn B**
Rutledge, C.	**78**
Schultes, N.	**Main Tent, Barn B**
Shepard, J.	**37**
Smith, H.	**41**
Smith, V.	**77**
Stafford, K.	**45, Main Tent, Barn B**
Stoner, K.	**71**
Vossbrinck, C.	**38**
Ward, J.	48, 49, 50, 76, **Main Tent**
White, J.	**33**, **34**, 51
Williams, S.	**48, 49**

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. CAES has existed for 135 years.

The CAES is the first 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 post graduate 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 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. New research has been started on crops for biodiesel fuel production. 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.
- 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.
- Finding the cause of salt marsh grass dieback.

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.

NOTES

PLANT SCIENCE DAY is held annually in August at Lockwood Farm, 890 Evergreen Avenue, Mt. Carmel, Hamden. Friends of the Experiment Station are invited to an *Open House* held in April at our New Haven laboratories on 123 Huntington Street.

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 06511-1106, (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

7/14/2010