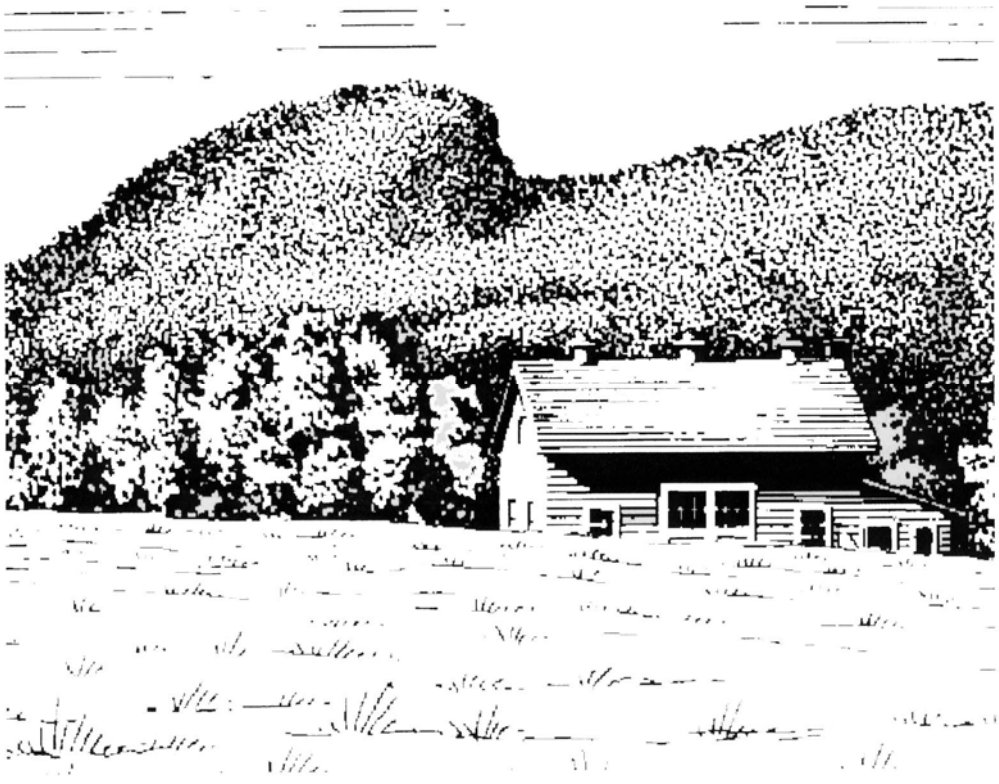
Plant Science Day

The Johnson Lecture • Short Talks • Demonstrations

Field Experiments • Nurserymen's Plant Discoveries

Century Farm Award • Barn Exhibits



Lockwood Farm, Hamden

August 4, 2004

History of Lockwood Farm, Hamden

Lockwood Farm is a research farm 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 acres to 75.0.

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 Sleeping Giant Mountain that 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 artists.

The soils of the farm developed on glacial drift 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 in 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 is 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 F, was observed on July 4, 1949. A record low temperature, -24 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 scientists at the Experiment Station who learn how to control the diseases 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.

THE SAMUEL W. JOHNSON MEMORIAL LECTURE

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

ANSWERS TO YOUR QUESTIONS

Staff 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.

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 Agriculture and Natural Resources Association.

Gotta's Farm

Gotta's Farm at 661 Glastonbury Turnpike in Portland was founded in 1898 by John Gotta who immigrated from northern Italy. He purchased the initial 20 acres of farmland, a barn, and a 10-room house for $1,100 with money he saved while operating a fruit store in New York City. Initial crops grown were fruit and tobacco. Dairy cows and chickens were also raised on the farm.

Gotta's is presently owned by Richard Gotta, great grandson of John Gotta. He lives on the farm with his wife Jackie and their young son Richard and daughter Elizabeth. Richard also has a son Christopher who is a local landscaper.

Richard's grandfather Leo took over the farm around 1918 and began growing a variety of vegetables. Richard's father Robert, uncle Jim Kane and aunt Jennie Kane became partners with their father in the late 1940s. Their first farm stand was built in 1947, and the cow's were sold in 1951. Richard's father became the sole owner of the farm in 1968. When he died in 1973, Richard and his mother, Helen, became the operators.

This diversified and well operated farm of 85 acres near the Connecticut River has 50 acres of sweet corn, 13 acres of apples, peaches, pears, plums, and nectarines, and 11 acres of tomatoes, peppers, cucumbers, melons, pumpkins, strawberries, and cut flowers. Pick-your-own is a feature for customers interested in fruit and strawberries at appropriate times during the year. Annual bedding plants, perennials, hanging baskets, and potted plants are grown under the 35,000 sq. feet of greenhouse space. A new farm stand with a bakery was completed in 2002. A satellite farm stand is located on Route 66 in Portland.

Richard Gotta is a member of several Connecticut agricultural organizations including the Connecticut Pomological Society, the Connecticut Farm Bureau, and the Connecticut Greenhouse Growers Association.

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

PLANT SCIENCE DAY

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION
LOCKWOOD FARM August 4, 2004

MAIN TENT, 11:30 A.M.

John F. Anderson–PRESIDING

CENTURY FARM AWARD

THE SAMUEL W. JOHNSON MEMORIAL LECTURE
Julie Belaga
"Turning Science into Public Policy"
Co-Chair of the Connecticut League of Conservation Voters, serves on the Boards of National Audubon CT, Connecticut Fund for the Environment, and is Vice Chairman of the Board of Directors of the Bank of Westport

REMARKS
Otto Schaefer
President, Experiment Station Associates

SHORT TALKS

10:15 *Sudden Oak Death-A Potential New Threat to Connecticut Forests* Victoria L. Smith
Sudden Oak Death is a relatively new disease of woody plants that originated in California in 1995. Many of our native woody plants are susceptible to the disease. This talk will include information on the plants affected, what symptoms look like, potential means of spread of the disease, and the efforts of the Experiment Station to stop this disease and protect our forests and nurseries.

1:15 *Learning to Live with West Nile Virus in Connecticut* Theodore G. Andreadis
In the summer of 1999, West Nile virus, a mosquito-borne virus native to Africa, Asia and Europe, was discovered in the western hemisphere for the first time when it caused an epidemic of human encephalitis in New York City and the death of thousands of birds in northern New Jersey and southeastern Connecticut. Over the last five years this exotic virus has spread at an unprecedented rate throughout the United States and Canada and has emerged as a major public health and veterinary concern. More than 14,000 human cases with 556 fatalities have occurred and nearly 20,000 horses have been afflicted, a third of which have died. Tens of thousands of wild birds, representing 162 species, have been killed, and the virus has been found in 14 species of mammals. Dr. Andreadis will review the emergence and spread of West Nile virus in North America and examine recent developments in our understanding of the ecology and epidemiology of this exotic emerging pathogen in Connecticut.

2:15 *Grub Diseases: What's Going on Under the Grass?* Douglas W. Dingman
In the United States, turf damage caused by beetle larvae (i.e., grubs) results in the loss of hundreds of millions of dollars annually. Microorganisms that cause diseases in these grubs, naturally occurring in the soil, help to remove grubs from the lawn and minimize damage. By understanding the mechanisms used by microbes to cause disease in these insects, useful information can be added to our practices for combating grubs. Additionally, knowledge on how disease processes work in general and on how diseases can evolve will be gained.

2:45 *Managing Hemlock Woolly Adelgid* Richard S. Cowles
Hemlock Trees experiencing tip dieback and yellowing foliage from adelgid feeding can recover completely following a single application of a systemic insecticide to the soil. While foliar sprays of horticultural oil or soap are effective for suppressing hemlock woolly adelgid, spraying larger trees requires specialized equipment and annual treatments. Systemic insecticide products, however, are easily applied, are available to homeowners and can provide multiple years of benefit.

DEMONSTRATIONS

10:45 *Diagnosis, Identification, and Processing of Insect Specimens* Kenneth A. Welch
Have you ever wondered how to identify that strange insect chomping on your veggies or wandering in your house? Come see a demonstration on how Station experts use the various resources at their disposal.

1:45 *The Wonders Beneath Our Feet-Simple Explanations of How Healthy Soil Works* Thomas M. Rathier
Never take your soil for granted! Amazing physical, chemical and biological events are constantly occurring in healthy soils. This demonstration will use simple examples to illustrate the importance of those things and how farmers and gardeners can transform weak soils into healthy, productive gardens.

BARN EXHIBITS

EMERGING PLANT DISESES CAUSED BY NEW STRAINS OF A COMMON PATHOGEN

Department: Plant Pathology and Ecology
Principal investigator: Wade H. Elmer
Fusarium is large genus of fungi that contains many species. In the past decade, new strains of common species have been found causing severe damage to ornamentals and vegetables.

MICRO RNA MOLECULES: RESISTING VIRUSES AND REGULATING DEVELOPMENT

Department: Biochemistry and Genetics
Principal investigator: Neil A. McHale
Double stranded RNA viruses are recognized as a foreign molecule in plants and destroyed by a ribonuclease called DICER. This same system is used by the plant to regulate expression of its own genes, particularly those controlling key aspects of growth and development.

BIOLOGICAL CONTROL OF HEMLOCK WOOLLY ADELGID

Department: Entomology
Principal investigator: Carole A. Cheah, Assisted by M.K. Frost and J. Parent
Hemlock Woolly Adelgid is a serious pest of eastern hemlocks in 16 eastern states from Maine to Georgia. This project reports on investigations into the potential and impact of imported predatory ladybeetles from Asia for the national biological control program to combat this pest in hemlock forests.

DISPERSAL AND ITS EFFECT ON FAWNING SUCCESS AMONG MALE WHITE-TAILED DEER

Department: Forestry and Horticulture
Principal investigator: Uma Ramakrishnan, Assisted by S. Williams
Male white-tailed deer generally disperse from where they were born. We found that about 10% of males do not disperse, and genetic analysis has revealed that these males have more fawns than males that immigrated into the area. We are examining the impact this has on the reproductive control of deer.

USING PLANTS TO CLEAN CONTAMINED SOIL

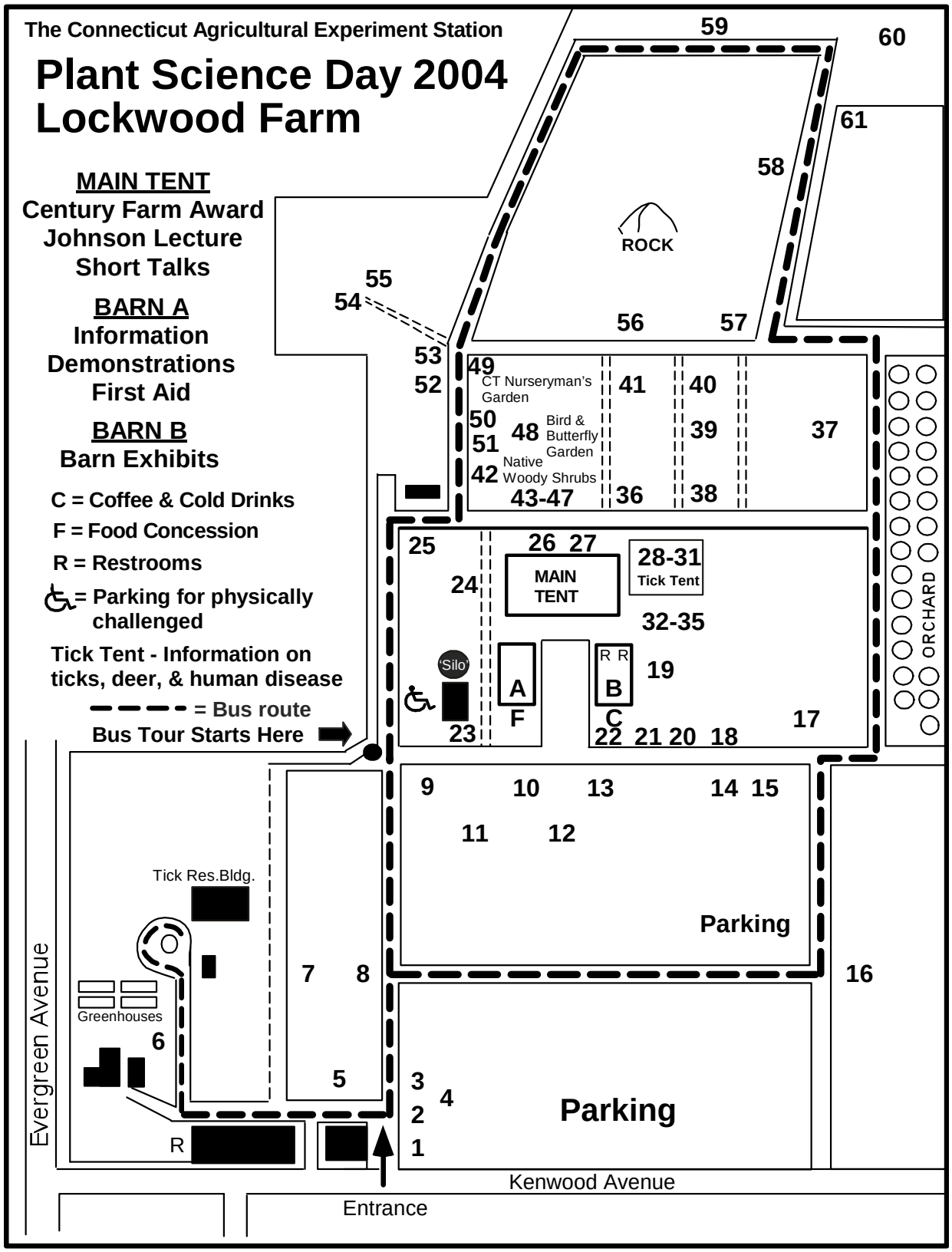
Department: Analytical Chemistry and Soil and Water
Principal investigators: Jason White and Mary Jane Incorvia Mattina
Phytoremediation is the use of vegetation to reduce pollutants in contaminated soil, sediment, and water. In the past, more research has focused on using plants to remove heavy metals from soil or to facilitate the biodegradation of organic pollutants such as organic solvents, gasoline, and oil. Persistent organic pollutants (POPs) have traditionally been very difficult to remediate. In spite of this, our research has identified certain plant species that are able to extract significant quantities of these contaminants from the soils in which the plants are grown.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION
The experiments exhibited here depict only a portion of the work of Station Scientists. In addition to Lockwood Farm and Laboratories in New Haven and Windsor, Station Scientists use state forests, private orchards, and farms for their experiments. Experiments and surveys of problems are conducted in many towns of the state.

THE EXPERIMENT STATION HAS A WEB PAGE
The address of the web page is http://www.caes.state.ct.us

TO RECEIVE A COMPLETE LIST OF STATION SPEAKERS: inquire at the Publications table in the barn or write to: Publications; The Connecticut Agricultural Experiment Station; P.O. Box 1106; New Haven, CT 06504-1106

TO RECEIVE A COMPLETE LIST OF AVAILABLE STATION PUBLICATIONS: Inquire at the Publications table in the barn or write to: Publications; The Connecticut Agricultural Experiment Station; P.O. Box 1106; New Haven, CT 06504-1106



Map Not to Scale

FIELD PLOTS

1. Chinese Chestnut Trees
2. Sheet Composting With Oak and Maple Leaves
3. Annual Culture of Globe Artichokes
4. Jilo Trials
5. Calabaza Squash
6. Effect of Shade on Quality of Greenhouse Tomato
7. Suppression of Crown Rot of Asparagus with Biological Control Agents
8. Utilization of Compost in Onion and Leek Production
9. Grape Variety Trial
10. Composting Leaves Using the Static Pile Method
11. Control of Blight on American Chestnuts
12. New Hybrid Chestnut Orchard
13. Question and Answer Tent
14. Alien Insects Recently Discovered in Connecticut
15. Identification of Caterpillars on Conifers in the Northeast
16. Orchard Chestnuts
17. Dispersal of Corn Pollen in the Atmosphere
18. Experiment Station Associates
19. Heirloom Tomato Trials
20. Stimulation of Native Microorganisms to Degrade Hazardous Compounds in Coal Tar Contaminated Soil
21. Spiders of Connecticut
22. Mosquito Surveillance for West Nile Virus
23. Verizon Telephone Transmission Silo
24. Milk as a Control for Powdery Mildew on Muskmelon
25. Minimum Fertilization for Home Gardens Amended by Leaf Compost
26. Crop-Tree Release Increases Black Birch Diameter Growth
27. Protecting Connecticut’s Lakes and Ponds from Nonnative Weeds
28. Lyme Disease in Ticks from Connecticut Citizens
29. The “Deer” Tick Ixodes Scapularis
30. Update on the Rodent Baitbox for the Control of the “Deer” Tick

31. Antibody Responses of Deer to Tick-Transmitted Agents
32. Connecticut Weeds and Wild Plants
33. Systemic Acquired Resistance – Non-Chemical Plant Disease Control
34. Indoor Molds of Human Health Significance
35. Plant Health Care for the Connecticut Nursery and Landscaping Industries
36. Cauliflower Trials
37. Milk as a Control for Powdery Mildew on Pumpkin
38. Fusarium Wilt of Tomato
39. Chemical Suppression of Fusarium Rot of Gladiolus
40. Fusarium Wilt of Basil
41. Milk as a Control for Powdery Mildew on Tomato and Zinnia
42. Native Woody Shrubs
43. Division of Forestry – Connecticut Department of Environmental Protection
44. Organic Agriculture and Land Care in Connecticut
45. Connecticut Farmland Trust
46. Southwest Conservation District
47. Connecticut Fund for the Environment
48. Butterfly and Bird Garden
49. Connecticut Nurserymen's Garden
50. Nursery and Bee Inspections
51. How Do Disease-Causing Bacteria Evolve?
52. Molecular Approaches to Fungal Population Studies
53. Chestnut Species and Hybrids
54. Dense Planting of American Chestnuts
55. Dwarf Hybrid Chestnut Trees
56. Insectary Plantings of Flowers to Attract Beneficial Insects
57. Aerial Spread of Rust Spores in a Soybean Canopy
58. Rocky Hill American Chestnut Trees
59. Beach Plum Trials
60. Pawpaw and Japanese Plum Variety Trials
61. Planting of Pinot Gris Grapes

FIELD PLOTS

The plots at Lockwood Farm are planted and maintained by Experiment Station scientists with the help of Farm Manager R. Cecarelli and his assistant, R. Hannan, and the following summer workers: K. Dixon, M. Harris, and M. Kutys.

1. CHINESE CHESTNUT TREES

S. Anagnostakis *Assisted by* P. Sletten

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

2. SHEET COMPOSTING WITH OAK AND MAPLE LEAVES

A. Maynard and D. Hill

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 1995-2003 and incorporated into the soil by rototilling. Last year, lettuce, peppers, and bush delicata squash were grown from transplants 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. Last year was similar to the preceding years with no significant differences in yields of any of the crops with any of the treatments. Organic matter content on the leaf amended plots increased to 4.9% compared to 4.2% on the unamended control plots and there was no difference in soil pH between the treated and control plots. The experiment is being repeated this year with lettuce, peppers, and edible soybeans.

3. ANNUAL CULTURE OF GLOBE ARTICHOKES

A. Maynard and D. Hill

Connecticut lies at the center of one of the largest artichoke-eating populations in the United States. Fully 40% of California's crop is sold through regional markets from New York to Boston. Annual production of Green Globe is triggered by use of vernalization (cool, moist treatment). In 2003, temperatures during the early growth of the plant were not sufficiently low to vernalize the plants. Green Globe requires 500-600 cumulative hours of below 50F temperatures to induce budding compared to Imperial Star which needs only 250 hours of cool temperatures. Only 39% of Green Globe plants produced buds. In comparison, 94% of Imperial Star plants produced buds. This year, if the Green Globe plants do not produce buds by late July, we will treat them with gibberellic acid, a natural plant hormone, to induce budding.

4. JILO TRIALS

A. Maynard and D. Hill

Jilo (*Solanum gilo*) is a solanaceous plant akin to eggplant. This tropical vegetable is grown principally in Nigeria. Its culture was transported to central and southern Brazil where it became a minor crop. Its principal use is in vegetable stew (ratatouille) and sweet and sour mixes with chicken and pork. In 1998,

a Bethel grower obtained seeds from a member of the Brazilian community in the Waterbury-Danbury area (estimated population 4500). The Connecticut Department of Agriculture obtained some of the seeds and sent them to the Experiment Station for further testing. We found that jilo grows well in Connecticut's climate and can produce up to 11 lb/plant when mulched with black plastic to warm the soil. We also found that jilo flowers abort when subjected to moisture stress. This year we are growing some plants with black plastic mulch while others are being grown with drip irrigation to insure a constant supply of water when droughty periods occur. These will be compared to plants grown on bare soil with water supplied only by natural rainfall. In 2003, total cumulative yield from mulched plants was 8.8 lb/plant, drip-irrigated plants, 6.4 lb/plant compared to 6.6 lb/plant from the controls. Black plastic mulch not only increased total cumulative yield but increased early yields in the first harvest month. We repeat the experiment this year.

5. CALABAZA SQUASH

A. Maynard and D. Hill

Calabaza squash, also known as tropical pumpkin, is mostly grown in tropical and semi-tropical climates. Calabaza is highly prized by consumers of Hispanic origin. It was identified by the Connecticut Department of Agriculture as one of the most sought-after vegetables at Connecticut's 65 farmers' markets. The vines of this tropical plant grow to 30-40 feet and require large amounts of space. El Dorado and La Estrella, two short-vine cultivars, were developed by the University of Florida. These cultivars have vines that range between 12-15 feet and their fruit matures in only 90 days, compared to 120 days for the traditional long-vine cultivars. The shorter vines and maturity makes them appealing to northern growers. Last year, one plant of La Estrella produced mature fruit in only 80 days on 12-foot vines. We saved the seeds from the fruit and have planted them in this field this year. We also planted a field at our Valley Laboratory in Windsor. We will continue to select for short-vined fruit that matures in only 80 days.

6. EFFECT OF SHADE ON QUALITY OF GREENHOUSE TOMATO

M.P.N. Gent *Assisted by* M. Short.

Shade cloth helps to cool a greenhouse, and often improves the quality of horticultural crops. However, shade also lowers the sunlight intensity and reduces yield of greenhouse tomatoes. Last year and this year we compare yield and quality of greenhouse tomatoes when grown simultaneously in identical greenhouses that differ only in the degree of shade. Each half of four greenhouses is shaded to a different degree; none, 15%, 30% or 50% shade, using reflective aluminized shade cloth. Each shade treatment is repeated in two houses. The greenhouses have been rebuilt to make them taller and to improve air circulation and give the plants more room to grow. In addition to yield and characteristics of the tomato fruit, we measure the temperature of the air and the plants, humidity, and the ratio of total to photo-synthetically active light, all of which are affected by shade.

7. SUPPRESSION OF CROWN ROT OF ASPARAGUS WITH BIOLOGICAL CONTROL AGENTS

W. Elmer *Assisted by* J. Bravo and E. Bruley

A soilborne disease called Fusarium crown and root rot destroyed commercial asparagus production in Connecticut during the 1950's and 1960's. Applications of NaCl will suppress this disease and increase yields. It is also known that early root colonization by beneficial organisms, like mycorrhizae, can increase the longevity of the planting. These plots were designed to use beneficial microbes with and without NaCl for their long-term effects on Fusarium crown and root rot and yield. After five years,

plots that were treated with mycorrhizae, beneficial fungi, and NaCl had the greatest yields. The NaCl treatment did not hinder the efficacy of the beneficial microbes.

8. UTILIZATION OF COMPOST IN ONION AND LEEK PRODUCTION

A. Maynard and D. Hill

Previous studies have shown that soils amended with compost increase onion yields. However, little research has been done determining the effectiveness of compost when used as a mulch. In leek production, soil is usually mounded to blanch the lower portion of the shank. Using compost would blanch the leek and also improve the soil. This experiment will determine the effectiveness of compost (incorporated and surface mulch) in onion and leek production. The 4 treatments include compost incorporated into the soil, compost as a surface mulch, incorporated compost plus compost mulch, and unamended control. All plots received the same amount (1300 lbs/A) of 10-10-10 fertilizer. Yield of both crops from the various compost treatments were compared to the unamended control plots. In addition, the length of the blanched shank in the leeks was measured. Last year, the greatest yields of both leeks and onions were from plots with compost incorporated into the soil with a compost mulch. Leek plots amended with compost mulch (some with incorporated compost, some without) had the longest blanched shank. These mulched plots also had the greatest percentage of Jumbo and Colossal (>3") sized onions. To determine any cumulative effects of the compost additions, this experiment, also repeated at the Valley Lab in Windsor, will be continued annually on the designated plots for two additional years.

9. GRAPE VARIETY TRIAL

W. Nail

Cultivars of wine and table grape varieties have been evaluated for their suitability to Connecticut conditions. There are three established plots. The original plot demonstrates several grape varieties which may be suitable for fresh table grapes, juice, or wine production. Another plot, established in 1992, is a replicated planting that compares the hybrid cultivars Chambourcin, Seyval blanc, Villard noir, and Villard blanc. A third plot, established in 2001, is a replicated planting comparing the red wine grape cultivars Regent, Chancellor, Chambourcin, and the as yet unnamed NY 70.0809.10 and NY 73.0136.17. A new planting of 300 Pinot gris vines (half on 3309C and half on 101-14 rootstock) was established this spring in another part of the farm to be used for cultural experimentation in the future.

10. COMPOSTING LEAVES USING THE STATIC PILE METHOD

A. Maynard and D. Hill

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.

11. 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 differences in resistance. The grafted tree in the center of the east row is from an "American" chestnut in Scientist's Cliffs, Maryland, 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.

12. 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.

13. QUESTION AND ANSWER TENT

S. Douglas, T. Rathier, K. Welch, G. Ridge, M. Inman, R. Hiskes, and J. Winiarski

Ask questions about plants, soils, and insects here.

14. ALIEN INSECTS RECENTLY DISCOVERED IN CONNECTICUT

C.T. Maier *Assisted by* J. Daigler, M. Lowry, S. Struble, S. Zappulla, and T. Zarrillo

Insects accidentally introduced from foreign countries have a costly impact on agriculture in the United States. Their effect on agriculture can be reduced by early detection and prompt implementation of management programs. During the past decade, we have detected many exotic insects previously unknown in Connecticut and have begun to study their biology. We have investigated the distribution, hosts, and period of adult activity of the small Japanese cedar longhorned beetle (*Callidiellum rufipenne*)—a wood-boring pest of coniferous landscape plants, the Asian apple tortrix (*Archips fuscocupreanus*)—a potential leafroller pest of fruit trees, the European green pug (*Pasiphila rectangulata*)—a blossom-feeding pest of apples and pears, a European needleminer (*Batrachedra pinicolella*)—a pest of spruces, and other exotic insects. Our discovery of the European needleminer represents a new North American record. In our display, we summarize our findings and show specimens of many non-native insects.

15. IDENTIFICATION OF CATERPILLARS ON CONIFERS IN THE NORTHEAST

C.T. Maier, C.R. Lemmon, J.M. Fengler, D.F. Schweitzer, and R.C. Reardon *Assisted by* T. Zarrillo

Foresters, Christmas tree growers, and homeowners face many challenges in their quest to grow healthy coniferous trees. From time to time, they must contend with insects eating the foliage of their trees. To reduce insect damage, growers of conifers must identify pest species correctly to select a suitable control method. We have developed a color guide to assist growers with the task of identifying caterpillars that eat the needles of their trees. Our guide, a joint project of the Experiment Station and the USDA Forest Service, provides color photographs and descriptions of caterpillars, their host plants, and a summary of their life cycle.

16. ORCHARD CHESTNUTS

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 included. Last year and this year we planted several new chestnut cultivars that we want to test for their production potential in Connecticut.

17. DISPERSAL OF CORN POLLEN IN THE ATMOSPHERE

D. Aylor *Assisted by* P. Thiel, M. Boehm, T. Schneider, and B. Skelly

The recent and rapidly accelerating introduction of genetically modified (GM) corn into agricultural production has sparked renewed interest in quantifying the aerial dispersal of corn (Zea mays) pollen. Off-site movement of pollen makes possible crosses of GM varieties with corn in non-GM organic and conventional production fields. We are developing a quantitative model of pollen movement in the atmosphere to help evaluate this possibility. Of central importance is the ability of pollen grains, which are shed by the anthers on the tassels above the canopy, to reach the silks at mid-canopy height, be deposited and then fertilize the ovules, which will become kernels of corn. In this plot we are studying the effect of the intervening leaves between the tassels and the silks to reduce the pollen exposure on the silks. Our preliminary data indicate that up to half of the corn pollen released can be intercepted initially by the leaves, but that a breeze can re-entrain some of this pollen and give it a second chance to reach the silks. This interception of pollen can have an important effect on seed purity, especially in a field where pollen may already be limiting.

18. EXPERIMENT STATION ASSOCIATES

Information is available on this organization formed to help the Experiment Station.

19. HEIRLOOM TOMATO TRIALS

A. Maynard and D. Hill

Interest and sales of heirloom tomatoes have increased dramatically in the past 10 years. More and more consumers are willing to forego appearance for that real old-fashioned tomato taste. But growing heirloom tomatoes can be a challenge. Heirlooms tend to have poor disease resistance and have lower yields when to compared to hybrid tomatoes. They are also more susceptible to cracking due to their tender skin. In this trial, we are evaluating 10 red varieties here and at our Valley Laboratory in Windsor. We will be comparing yields, disease resistance, and timing of harvest. This trial will be repeated for several years evaluating other colored varieties in addition to the traditional red varieties.

20. STIMULATION OF NATIVE MICROORGANISMS TO DEGRADE HAZARDOUS COMPOUNDS IN COAL TAR CONTAMINATED SOIL

J. Pignatello and J. Li

We studied the biodegradation of a set of 15 polycyclic aromatic hydrocarbon (PAH) compounds in a coal-tar contaminated soil from a former manufactured gas plant site in Connecticut to evaluate the feasibility of *in situ* bioremediation. Experiments were conducted in well-mixed, aerated soil-water mixtures containing various dissolved additives over a 93-106 day period. In separate sterile control samples we also monitored the physical desorption of the compounds from the particles to the water phase where they were trapped by a polymer adsorbent. Six-ring and some 5-ring PAH compounds were neither biodegradation nor desorbed. Biodegradation of 3-5 ring PAHs by native microorganisms was strongly accelerated by addition of inorganic nutrients (N, P, K and trace metals). Nutrient-assisted

biodegradation by native organisms was faster than desorption, suggesting some sort of facilitated desorption mechanism. Moreover, nutrient-assisted biodegradation by native organisms was not accelerated by addition of a bacterial culture having high PAH-degrading capability. This indicates that native bacteria in site soil, adequately supplied with nutrients, are poised to degrade the PAH compounds. The persistence of PAHs for many decades at this site, thus, is likely due to nutrient-limited natural biodegradation. The results also suggest that an effective strategy for bioremediation could consist simply of adding inorganic nutrients.

21. SPIDERS OF CONNECTICUT

C. Vossbrinck

Connecticut has a wide array of native spider species from hunting spiders like wolf spiders to orb weaving spiders, which build elaborate webs in forests and fields. There are three spiders commonly found in the home: the comb footed spider *Archaearanea tepidariorum* (the house spider) responsible for the "cob webs" in your house, a greenish-yellowish hunting spider *Chiracanthium mildei* which may, on rare occasion, be responsible for spider bites and the long legged cellar spider *Pholcus phalangoides* seen in basements and garages. While we all have a certain amount of "Arachnaphobia" Fear of spiders), the spiders of Connecticut are really harmless and helpful creatures. Poisonous versus Venomous: Nearly all spiders have a venom which they can inject into prey insects such as flies, moths and beetles to stun or kill them (they are nearly all venomous). If the venom of a particular spider species is toxic to humans then it is poisonous. There is only one spider found rarely in Connecticut, the Black Widow spider *Lactrodectus mactans*, which is poisonous. The poison, like most biological agents, effects the humans on a per weight basis and therefore the effect of the spider toxin depends on the amount injected by the spider and the size of the person.

22. MOSQUITO SURVEILLANCE FOR WEST NILE VIRUS

T. Andreadis, J. Anderson and P. Armstrong *Assisted by* J. Shepard, M. Thomas, S. Finan, B. Hamid, A. Main, T. Goodman, M. Vasil, F. Beecher, E. Calandrella, J. Capotosto, L. Cash, R. Ferrucci, L. Haibi, C. Godman, K. Gohen, D. Gonzalez, C. McGee, M. Misencik, T. Petruff, S. Reiff, C. Secker-Walker, and K. Startz

Surveillance for West Nile virus (WNV) in mosquitoes has been integral to the public health response to WNV in Connecticut. Trapping is conducted daily from June through October at 91 locations statewide. The objectives are to provide: 1) early evidence of local WNV activity; 2) information on the abundance, distribution, identity and infection rates of potential mosquito vectors and; 3) baseline data that is used to assess the threat of WNV to the public and guide the implementation of mosquito control measures. Since 1999, The Connecticut Agricultural Experiment Station has trapped and tested over 700,000 mosquitoes. A total of 210 isolations of WNV have been obtained from 17 species of mosquitoes. *Culex pipiens, Culex salinarius, Culex restuans, Culiseta melanura*, and *Aedes vexans* have been implicated as the most likely vectors of WNV in the region. The principal foci of WNV activity in Connecticut have further been identified as densely populated residential communities in coastal Fairfield and New Haven Counties, and in the case of 2002, similar locales in proximity of the city of Hartford. In almost all instances we observed a correlation both temporally and spatially between the isolation of WNV from field-collected mosquitoes and subsequent human cases in these locales, and the incidence of human cases has closely paralleled the number of virus isolations made from mosquitoes with both peaks falling in early September. We conclude that the isolation of WNV from field-collected mosquitoes is a sensitive indicator of virus activity that is associated with the risk of human infection that habitually extends from early August through the end of October in Connecticut.

23. VERIZON TELEPHONE TRANSMISSION SILO
Learn about the cellular transmission tower.

24. MILK AS A CONTROL FOR POWDERY MILDEW ON MUSKMELON
F. Ferrandino and V. Smith
A 50% milk/water mixture applied as a foliar spray every 7-10 days is being evaluated as an environmentally-friendly control for powdery mildew. Past years have demonstrated that whole milk works better than skim milk. This year the efficacy of powdered milk solutions are being examined.

25. MINIMUM FERTILIZATION FOR HOME GARDENS AMENDED BY LEAF COMPOST
A. Maynard and D. Hill
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, 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 under 2/3 and 1/3 fertilization have been consistently greater than on unamended plots with full fertilization.

26. CROP-TREE RELEASE INCREASES BLACK BIRCH DIAMETER GROWTH
Jeffrey S. Ward *Assisted by* J.P. Barsky
Black birch (*Betula lenta*) is an increasing component of the Connecticut forest where it currently accounts for nearly 11% trees with diameters < 10 inches. Crop-tree management (complete release) is one possible method of concentrating growth on individual stems. The concept is similar to weeding in a garden. Research was begun in 1996 to determine how crop-tree release affects diameter and crown growth of black birch, and whether crop-tree release affects potential sawtimber quality. Five crop tree plots were established in cooperation with Division of Forestry-CT DEP, Metropolitan District Commission, the Regional Water Authority, and Northeast Utility Forest Management Lands in cooperation with Ferrucci and Walicki, LLC. At least sixty crop trees were selected at each study (317 trees total) and half of the trees were released as part of a thinning operation. Black birch has responded well to release. Diameter growth of released trees was 70% greater than for unreleased trees during 1996-2003. This suggests that crop-tree management may be a valuable management tool in areas with a high proportion of black birch.

27. PROTECTING CONNECTICUT'S LAKES AND PONDS FROM NONNATIVE WEEDS.
G. Bugbee, J. White, and R. Capers *Assisted by* R. Selsky, J. Slusher and C. Manuck
Connecticut is home to thousands of lakes and ponds that provide a multitude of recreational opportunities, valuable wildlife habitats and peaceful retreats. Protecting this natural resource is important if it is to be enjoyed by future generations. The recent introduction of nonnative aquatic plants such as Eurasian milfoil, variable milfoil and fanwort is of great concern. These plants can rapidly crowd out native plant species because they have few natural enemies. Their dense stands often reach the surface and interfere with recreational uses. Requests for station assistance in controlling unwanted aquatic vegetation are frequent. Scientists in the Department of Soil and Water are documenting the

extent of the invasive aquatic plant problem in Connecticut and studying methods of control. Research includes studies on the relationships between land use and nutrient loading, strategic placement of herbicides, drawdown, dredging, mechanical harvesting and hydroraking. Recently work has begun on a statewide inventory of freshwater aquatic vegetation. Work will be conducted over several years in order to document the state's aquatic plant communities. At this exhibit you will see examples of the invasive weeds, maps of recently studied lakes, our aquatic plant surveillance and control boats and underwater video equipment. Scientists will be available to discuss problems you are having with your lake or pond.

28. LYME DISEASE IN TICKS FROM CONNECTICUT CITIZENS

J. Anderson *Assisted by* B. Hamid, E. Alves, and M. Guidone

Ticks which have fed on humans were tested for the presence of the Lyme Disease bacterium (*Borrelia burgdorferi*) at the request of municipal health departments. In 2003, 5886 black-legged, or deer, ticks (*Ixodes scapularis*) were received, along with 295 dog ticks (*Dermacentor variabilis*) and 56 lone star ticks (*Amblyomma americanum*). Of these, 31% of tested ticks were infected. The infected ticks were collected from people living in 100 towns in the state.

29. THE "DEER" TICK *IXODES SCAPULARIS*

K. Stafford *Assisted by* H. Stuber, J.P. Barsky, C. Stoehr, S. Cardona, A. Penna, M. Nelson, and L. Colligan

The blacklegged tick or "deer" tick *Ixodes scapularis* transmits the agents of Lyme disease, babesiosis, and anaplasmosis (i.e. human granulocytic ehrlichiosis). Observe live and preserved ticks under the microscope. A new Tick Management Handbook is available.

30. UPDATE ON THE RODENT BAITBOX FOR THE CONTROL OF THE "DEER" TICK

K. Stafford *Assisted by* H. Stuber, J.P. Barsky, C. Stoehr, S. Cardona, A. Penna, M. Nelson, and L. Colligan

Evaluation of the now commercially available fipronil-based rodent bait box (Maxforce® TMS, Bayer ES), was continued in inland residential settings in Connecticut as part of Lyme disease community intervention programs. In 2003, mice and chipmunks visited 97% of the boxes in two Westport and Weston neighborhoods, resulting in a 69% reduction of ticks on these hosts. The boxes were heavily utilized in 2004 and the impact on tick abundance at the treated homes is presented.

31. ANTIBODY RESPONSES OF DEER TO TICK-TRANSMITTED AGENTS

L. Magnarelli, U. Ramakrishnan, and K. Stafford III *Assisted by* T. Blevins

Blacklegged ticks transmit *Borrelia burgdorferi* and *Anaplasma phagocytophilum*, bacterial agents that cause Lyme disease and human granulocytic ehrlichiosis, respectively. Deer are important hosts for immature and adult ticks, and although they show no signs of Lyme arthritis, they are ideal for monitoring natural infections. Antibody tests were developed to determine prevalence of infection. Of the 218 deer sera analyzed in a recent study, 115 (53%) and 113 (52%) were positive for antibodies to *B. burgdorferi* or *A. phagocytophilum*, respectively. Antibody responses in deer to the former, however, were much broader than those to the latter. Multiple surface proteins of *B. burgdorferi* were immunologically recognized. This is a pattern that is typical of human infections in later stages of illness marked by arthritis. Conversely, as in human infections, antibodies were produced to very few surface proteins of *A. phagocytophilum*, an organism that attacks white blood cells. Both pathogens are widely distributed in Connecticut and may co-exist in humans and deer, but it is unknown why deer do not develop arthritis or other inflammatory joint problems associated with *B. burgdorferi* infections.

32. CONNECTICUT WEEDS AND WILD PLANTS
T. Mervosh *Assisted by* J. Simmons
Plants found growing wild in fields and landscapes of Connecticut are displayed. Taxonomy, life cycles, and toxicity/edibility information will be presented. Special emphasis will be placed on non-native, invasive plant species. Weed control questions will be addressed.

33. SYSTEMIC ACQUIRED RESISTANCE - NONCHEMICAL PLANT DISEASE CONTROL
J. A. LaMondia *Assisted by* J. Canepa-Morrison
Systemic Acquired Resistance (SAR) is a phenomenon in plants in which plants normally susceptible to disease may become resistant after an 'immunization' triggers innate plant resistance mechanisms. Actigard 50 WG (active ingredient acibenzolar-S-methyl) is a new SAR product registered by Syngenta Crop Protection, Inc. as a "plant activator." It is not a fungicide and has no direct effect on pathogens, but reduces disease severity by inducing plant defense reactions. Actigard acts as a structural analogue of salicylic acid and triggers defense reactions effective against several plant diseases. We evaluated Actigard, standard fungicide application programs, and a combination of both at reduced Actigard rates for control of tobacco blue mold, a leaf spot disease that has caused millions of dollars of losses over the last few years. Our results indicated that Actigard alone resulted in acceptable disease control. In addition, low rates of Actigard interacted synergistically with standard fungicides to result in superior disease control.

34. INDOOR MOLDS OF HUMAN HEALTH SIGNIFICANCE
D. Li
A number of fungi can grow in indoor environments. Under certain conditions, some of these fungi can produce mycotoxins or elicit allergenic responses resulting in human health risk. A research program has been initiated at the Valley Laboratory concerning indoor molds. This research will include fungal taxonomy, the development of detection methods, the effects of environmental conditions on fungal growth and mycotoxin production, and the prevention and control of infestations.

35. PLANT HEALTH CARE FOR THE CONNECTICUT NURSERY AND LANDSCAPING INDUSTRIES
T. Abbey
Plant health care for ornamental plants is a management strategy that includes traditional integrated pest management (IPM) used in production nurseries, and also emphasizes proper plant selection, planting procedures, and plant maintenance (pruning, watering, etc.) in the landscape. Nurseries in Connecticut receive on-site assistance with development of IPM programs to improve pest management. The results from an evaluation of mycorrhizal fungi, biostimulants and planting gels on the establishment and growth of four woody ornamental plant species are presented.

36. CAULIFLOWER TRIALS
A. Maynard and D. Hill
Recent developments in the fast-food industry, to provide low-carbohydrate foods to diet-conscious consumers, prompted a replacement of mashed potatoes with mashed cauliflower. In 1986, 1987, 1988, and 1994, we tested 47 cultivars of cauliflower for yield and quality. Most of the cultivars tested are no longer available from seed companies. This year we are testing 20 new cultivars released since 1994 to find those that grow well in Connecticut’s soil and climate. Most of these new cultivars have naturally

tight wrapper leaves, which are needed to blanch the curds, thus eliminating the need for tying the leaves, an expensive step in cauliflower production. We will grow spring and fall crops here and at the Valley Laboratory, Windsor, and evaluate yield and head characteristics.

37. MILK AS A CONTROL FOR POWDERY MILDEW ON PUMPKIN
F. Ferrandino and V. Smith
A 50% milk/water mixture applied as a foliar spray every 7-10 days is being evaluated as an environmentally-friendly control for powdery mildew. Past years have demonstrated that whole milk works better than skim milk and the use of milk-based foliar sprays reduces postharvest fruit rot by 50%. This year the efficacy of powdered milk solutions are being examined.

38. FUSARIUM WILT OF TOMATO
W. Elmer *Assisted by* J. Bravo and E. Bruley
Most commonly grown tomato varieties are resistant to Fusarium wilt, a disease caused by a soilborne fungus. However, older varieties still get Fusarium wilt. These microplots have been designed to study the persistence of the Fusarium wilt fungus in tomato culture. This year there are no treatments. We are attempting to establish the fungus in the soil by planting susceptible 'Bonny Best' tomatoes.

39. CHEMICAL SUPPRESSION OF FUSARIUM ROT OF GLADIOLUS
W. Elmer *Assisted by* J. Bravo and E. Bruley
Fusarium corm rot of gladiolus is found wherever gladioli are grown. The disease is caused by a soilborne species of *Fusarium.* These plots are planted with the highly susceptible cultivar 'Purple Passion.' The study is designed to compare different combinations of chemical fungicides for their efficacy in reducing the severity of the disease and for enhancing the quality of the flowers. In 2003, the fungicides Terraguard and Medallion were the most effective.

40. FUSARIUM WILT OF BASIL
W. Elmer *Assisted by* J. Bravo and E. Bruley
Basil has become one of the most popular herbs grown in the US. The seedborne disease Fusarium wilt causes major losses of basil globally. These plots were planted to basil and inoculated in 2001, but were rotated out of basil for three years and cropped to herbs other than basil during the summer and planted with cover crops during the winter. The objective is to determine which rotation crops will promote the disappearance of the disease. Plots will be planted to basil in 2005.

41. MILK AS A CONTROL FOR POWDERY MILDEW ON TOMATO AND ZINNIA
F. Ferrandino and V. Smith
A 50% milk/water mixture applied as a foliar spray every 7-10 days is being evaluated as an environmentally-friendly control for powdery mildew. Past studies on tomato indicate that a 2.3% lactose solution is also effective against this fungus. This year powdery mildew on zinnia will be included in the study.

42. NATIVE WOODY SHRUBS
Jeffrey S. Ward *Assisted by* E.P. Belinsky
Native woody shrubs offer an alternative to exotics commonly used in landscaping. This collection of shrubs was assembled in 1962 and in 1976 it was arranged in its present form with a dry site on the gravel mound and moist site in the shallow, plastic-lined depression. Many of these shrubs flower in the

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

43. DIVISION OF FORESTRY - CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP Foresters will be available to provide information on State Forests, Forest Management, Service Forestry, The Forest Practices Act, Changes to the Forest Land portion of Public Act 490, and Urban Forestry and Wildfire Prevention.

44. ORGANIC AGRICULTURE AND LAND CARE IN CONNECTICUT

B. Duesing

The Northeast Organic Farming Association of Connecticut (CT NOFA) is a non-profit educational organization whose members include farmers, gardeners, land care professionals and consumers who are interested in organic methods and in local, organic food. Our display features pictures of this state's organic farms and landscapes. Directories of Connecticut's organic farms and organic land care professionals will be available. Announcements of upcoming events and educational literature to help farmers and home gardeners use organic methods effectively will be provided. For more information about its programs, publications, conferences and special events, contact CT NOFA at http://www.ctnofa.org, http://www.organiclandcare.net , 203 888-5146 or Box 386, Northford, CT 06472.

45. CONNECTICUT FARMLAND TRUST

E. Moore

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 remaining 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. Connecticut Farmland Trust accepts donations of farmland and agricultural conservation easements as well as purchases farmland and agricultural conservation easements. In its first two years, CFT has protected 4 active family farms, totaling more than 610 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@ctfarmland.org, Website: http://www.ctfarmland.org.

46. SOUTHWEST CONSERVATION DISTRICT

J. DeRisi

The Southwest Conservation District, located at 900 Northrop Road, Wallingford, Connecticut is a non-profit conservation agency established in 1946.The primary mission of the Southwest Conservation District is to supply technical assistance, information and education in natural resource conservation and management to agricultural cooperators, landowners and the municipalities in Southwest Connecticut. The Southwest Conservation District provides service Monday through Friday from 8:30 AM to 4:30

PM. Since we are in and out of the office, you are invited to call first (203-269-7509) to be sure someone is in. You can also visit our web site at: http://wwwconservect.org.

47. CONNECTICUT FUND FOR THE ENVIRONMENT
B. McGovern
Connecticut Fund for the Environment, founded in 1978, is the state's nonprofit legal champion for the environment. CFE uses law, science, public outreach and education to improve air and water quality, control toxic contamination, minimize the adverse impacts of highways and traffic congestion, protect public water supplies and preserve the open space and wetlands so crucial to both the state's citizens and its wildlife.

48. BUTTERFLY AND BIRD GARDEN
Created by Landscape Designer A. Bell, L. Starr, and B. Payton *Assisted by* R. Cecarelli, Lockwood Farm staff, and R. Bonito, maintained by Spring Glen Garden Club.
The garden is a joint project of The Experiment Station and the Federated Garden Clubs of Connecticut. The second stage of a butterfly and bird garden can be viewed as well as the third year growth of a butterfly meadow. Two bluebird houses have been added to the adjoining meadows. Guided butterfly identification walks will be available as well as literature on butterfly larval and nectar sources.

49. 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 is available.

50. NURSERY AND BEE INSPECTIONS
V. Smith, J. Fengler, I. Kettle, S. Sandrey, and P. Trenchard
Our personnel uphold laws by the state legislature enacted to protect Connecticut's vegetation from injurious insects and disease. Each year we inspect 7,500 acres of nursery stock grown in over 350 nurseries for insects and disease. 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 and the hemlock woolly adelgid. Examples of insect pests and plant diseases are exhibited. Insect survey maps are shown. Connecticut has about 345 beekeepers tending 2,300 colonies of honey bees. A task of the Experiment Station is to seek 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.

51. HOW DO DISEASE-CAUSING BACTERIA EVOLVE?
D. W. Dingman *Assisted by* C. Musante
Paenibacillus popilliae and *Paenibacillus lentimorbus* cause milky disease in larvae of Japanese beetles (*Popillia japonica* Newman) and related scarab beetles (e.g., Oriental beetle, Asiatic Garden Beetle, and European chafer) through an enteroinvasive process. A stock collection of these two bacterial species containing strains isolated from many different insect hosts and from several different US and world-

wide locations has been produced. Pulsed-field gel electrophoresis has been performed on I-*Ceu* I digested genomic DNA obtained from these different strains to identify genomic DNA fingerprints. Using these DNA fingerprints and fingerprint data obtained by other investigators, these bacterial species and strains are being assembled into groupings based on the host insect of origin. These groupings demonstrate lines of evolution of these bacteria in association with lines of insect classification. Investigations are continuing into how these bacteria have evolved in their disease-causing capabilities. Comparative analysis of DNA sequence differences in the ITS region of bacterial chromosomes has been performed between *P. popilliae* and *P. lentimorbus* to determine how two closely related, but different, bacteria which cause the same disease have become evolutionarily separated. An examination of the bacterial genome for pathogenicity islands (i.e., transmissible cassettes of DNA encoding disease-causing traits) is to be performed on *P. popilliae*, *P. lentimorbus*, and *Paenibacillus larvae* (causative agent of American foulbrood in honey bees). Grouping these bacteria based on sequence differences of pathogenicity islands will help to define how these bacteria, and this DNA segment, have evolved to promote disease-causing capabilities in specific insect hosts.

52. MOLECULAR APPROACHES TO FUNGAL POPULATION STUDIES

R. Marra

An effective plant disease control strategy depends on understanding the nature, source, and evolution of genetic variability in populations of the pathogen. Prior to the availability of molecular approaches, genetic studies of populations were confined to those organisms for which there were morphologically distinguishable heritable traits ("markers") that could be traced among populations as well as from generation to generation. Currently available molecular methods now allow us to scrutinize a microorganism's entire genome for appropriate markers, which can then be used to study genetic variation among individuals within populations and evolutionary relationships among species. Molecular markers that have been developed for the chestnut blight pathogen, *Cryphonectria parasitica*, have enabled us to elucidate the pathogen's mating system and describe genetic structure of populations in Asia, North America, and Europe, studies that have helped us understand the dynamics of hypovirus biocontrol. We will use a similar approach in the study of *Nectria galligena*, a pathogen of sweet birch as well as other important hardwood trees of Connecticut forests.

53. CHESTNUT SPECIES AND HYBRIDS

S. Anagnostakis *Assisted by* P. Sletten

These trees are part of the large collection of species and hybrids of chestnut maintained by The Experiment Station. Great differences can be seen in chestnut blight resistance, form, and nut production. Hypovirulent strains of the blight fungus help protect them from lethal cankers (see CONTROL OF BLIGHT ON AMERICAN CHESTNUTS plot). 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. Two trees of the chinquapin native to Florida are planted across the road. The cultivar Lockwood is at the southwest corner.

54. 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), and it looks slightly better than the south plot.

55. 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 (see sign) was released to the nursery industry in 1999.

56. INSECTARY PLANTINGS OF FLOWERS TO ATTRACT BENEFICIAL INSECTS

K. Stoner *Assisted by* E. Amezzane, T. Zarrillo and M. Lowry

It has long been a goal of gardeners and farmers to attract beneficial insects for pollination and for predation and parasitism of insect pests. Many of these beneficials feed on pollen or nectar during some stage of their life cycle. We have planted groups of plants that flower at different times, and we will be sampling them during their flowering periods to assess numbers of bees, wasps (both large predatory wasps and small parasitic wasps), hover flies, lacewings, lady beetles, and other beneficial insects. Among the early blooming annual plants are: corn poppy, baby blue eyes, baby's breath, and candy tuft. Flowering in mid-season are: borage, California poppy, buckwheat, alyssum, and bishop's flower. Late blooming are: nasturtium, cosmos, marigold, scarlet flax and a mix called "Autumn Beauty." We also have plantings of perennial flowers, which typically bloom for a shorter time than annuals but carry over from one year to another. Among the perennials are: yarrow, anise hyssop, lovage, Maximilian sunflower and blue flax.

57. AERIAL SPREAD OF RUST SPORES IN A SOYBEAN CANOPY

F. Ferrandino

Soybean rust is a major problem in all soybean producing regions of the world except the United States. This pathogen can cause up to 80% loss of yield and has the potential to cause economic losses on the order of tens of billions of dollars per year in this country. The spread of this pathogen is mainly by wind. For this experiment the aerial dispersal of a surrogate non-threatening rust pathogen will be studied in order to project the possible spread of soybean rust.

58. 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) to keep them alive. In addition, five of the trees have been pruned heavily, and we will harvest all of the nuts by cutting the burs before they have ripened. From the number of these nuts and the size of the sprouts from which they came we will estimate potential yield.

59. BEACH PLUM TRIALS

A. Maynard and D. Hill

Beach plum (*Prunus maritime* Marsh.) is a fruiting shrub native to the coastal dunes of the Northeastern United States. Since colonial times, people have collected wild fruit to make preserves and jelly. 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 Lab. These seedlings were raised at Cornell University from seeds collected from 35 sites from Maine to Delaware. The trees will be evaluated annually and select elite individuals will be propagated as possible cultivars in the future. In their first growing season, seedlings from Dewey Beech, Delaware averaged the greatest growth (10.8 inches) at Lockwood Farm while seedlings from Atsion, New Jersey averaged 10.2 inches.

60. PAWPAW AND JAPANESE PLUM VARIETY TRIALS

A. Maynard and D. Hill

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 and 4 cultivars of pawpaws. Thus far, Japanese plum cultivars Methley and Shiro appear to be most sensitive to black knot. We will be taking our first yields and evaluating fruit from the Japanese plums at both sites later this summer.

61. PLANTING OF PINOT GRIS GRAPES

W. Nail

See the abstract for GRAPE VARIETY TRIAL.

Tents were set up and other physical arrangements were made by A. Gagliardi and R. Russell under the supervision of Bancroft Nicholson of the Maintenance Department.

History of The Connecticut Agricultural Experiment Station

The Connecticut Agricultural Experiment Station is one of a national network of agricultural experiment stations. Experiment Stations are a cooperative research effort of the states and federal government to deal with local, regional, and national problems. The Station celebrated its 125th anniversary during 2000.

The Connecticut Agricultural Experiment Station, the first agricultural Experiment Station, grew out of the efforts of Samuel W. Johnson, a student 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 in a chemistry laboratory at Wesleyan University in Middletown, the Station was moved to Yale in 1877, where its first bulletin reported an analysis of a fertilizer that had little agricultural value. In 1882, the Station moved to its present location on Huntington Street. Besides Lockwood Farm, its outdoor laboratory in Hamden, the Station also has a research farm and laboratory in Windsor.

Through the years, many important discoveries have been made by researchers at The Connecticut Agricultural Experiment Station. For example, the first vitamin 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.

Research at the Station covers plant 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. The Station also analyzes fresh fruits and vegetables for excess pesticide residues, tests fertilizers and animal feeds for compliance with label claims, and tests a wide variety of foods as part of the state's food safety monitoring.

Current Research includes:

- Release of a lady beetle which has promise in controlling the hemlock woolly adelgid, which is killing 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 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 viruses in mosquitoes
- Enhancing growth of crops through the use of compost as a substitute for fertilizer
- Finding new crops for Connecticut farmers and studying the best varieties of existing crop plants for Connecticut conditions.

The experiments at Lockwood Farm are only a portion of the experiments of Station scientists. They do laboratory experiments in New Haven and Windsor, and carry out other experiments in state forests and on private farms.

PLANT SCIENCE DAY is held annually in August at Lockwood Farm, Evergreen Avenue, Mt. Carmel, Hamden. Friends of the Experiment Station are invited to *Agricultural Chemistry Night* held in the autumn and *Plant Science in the Spring* held in the spring.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, founded in 1875, is the first 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 06504

VALLEY LABORATORY
153 Cook Hill Road; Windsor, CT 06095

LOCKWOOD FARM
890 Evergreen Avenue; Hamden, CT 06518

SEE THE STATION'S WEB PAGE AT: WWW.CAES.STATE.CT.US

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