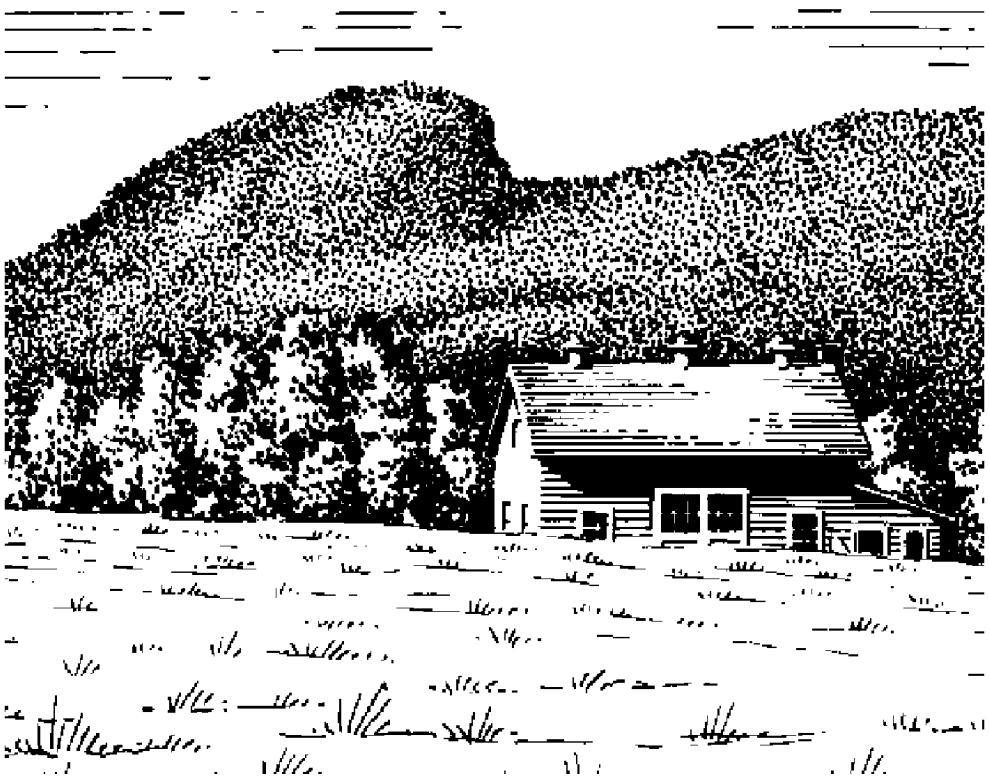
Plant Science Day

The Johnson Lecture • Short Talks • Demonstrations

Field Experiments • Nurserymen's Plant Discoveries

Century Farm Award • Barn Exhibits



Lockwood Farm, Hamden

August 6, 2003

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.

TALLMADGE BROTHERS, INC., NORWALK

Today's 24,000 acres of oyster beds tended by Tallmadge Brothers, Inc. include some of the same Long Island Sound beds that have been in operation since 1875. But the Bloom family legacy of farming oysters reaches back to the earliest colonists who received royal grants for their beds from the British crown in the 1700's. From those early times, Long Island Sound oyster farmers were pioneering the practice of repopulating prime growing grounds with juvenile oysters transplanted from remote, more thickly settled beds. Oyster cultivation was a way of life by the late 1800's, and Long Island bluepoints were considered among the best oysters in the world.

By the time brothers Norm and Hillard Bloom graduated from high school in 1947, they had been well educated in the oyster business by their uncle, Wallace Bell and by another oysterman, Fred Lovejoy. They had grown up on the water and had strong family ties to Norwalk's oystering tradition. Working for the Bell and Fordham Oyster Companies, Norman and Hillard saved enough money to buy their first oyster boat and begin their own personal tradition, one tied to an understanding of the cyclical nature of oyster farming.

Reverses in the oyster business, including the hurricane of 1938 which smothered oysters under layers of sediment, the pollution of Long Island Sound from wartime industries in the 1940's, and devastating hurricanes in the 1950's, resulted in the virtual disappearance of commercial oyster farming by 1956. But the Bloom brothers stayed in business by harvesting clams while learning hard lessons about the cycles of oyster farming.

The Congressional passage of the Clean Water Act in 1972 set the stage for the recovery of Long Island Sound. Hillard and Norm Bloom were poised for the beginning of a long comeback for Long Island Sound oyster farming. Working twelve to fifteen hours a day, the brothers continued to put all their earnings back into the business. They purchased oyster companies as they went up for sale, including Tallmadge Brothers, Inc. owned and operated by Hillard's wife's family since 1875. With a vision and faith in the future, they put to work their heritage of oyster farming, their growing knowledge of modern aquaculture science, and their rebuilding and maintenance of oyster boats. By the year 2000, the family owned their own packing plant, processing and refrigeration facilities, and a shipyard to maintain their fleet of 22 boats. They had seen the return of rich oyster harvests.

The Bloom brothers enthusiastically supported the Connecticut Department of Agriculture's cultch program, which provides millions of bushels of clean oyster shells to oystermen to spread on the

sea floor at spawning time. The oyster larvae need the clean, hard shells to attach themselves in order to grow.

Hillard Bloom continued working after Norman's death in 1989. He kept a broad view of oyster farming in the context of the health of the waters of Long Island Sound. The Bloom Brothers contributions to educational efforts, the Long Island Soundkeeper Fund, the Maritime Aquarium at Norwalk, and the Norwalk Seaport Association have been significant and rewarding to the entire state. In 1994, Governor Lowell P. Weicker, Jr. honored Hillard Bloom as patron, scientist, and seaman for his work and funding for the new shellfish and water quality laboratory in Milford.

Since Hillard Bloom's death in 2001, daughters Leslie Miklovich and Penny Mola, son Hillard Bloom, grandson Hillard Bloom, Jr. and cousin David Hopp continue on in the same time-honored traditions. The oyster boats *Robert M. Utz* originally built in 1917 and *Columbia* from the late 1800's are still at work out of Norwalk. David Hopp has taken time out from his post as captain to establish a seed oyster hatchery to replenish the beds. Hillard and Norman Bloom's hard-won understanding of the cycles of oyster farming continue to guide succeeding generations.

The benefits of Tallmadge Brothers, Inc.'s vision, their commitment to excellence, and their commitment to clean water in Long Island Sound are a legacy of inestimable value to Connecticut. It is my great pleasure to sign this Century Farm Citation recognizing Tallmadge Brothers, Inc. the recipient of the 2003 Century Farm Award sponsored by the Connecticut Agriculture and Natural Resources Association, Inc.

STATION WEB PAGE

The Experiment Station has a world wide web page at: WWW.CAES.STATE.CT.US

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 6, 2003

MAIN TENT, 11:30 A.M.

John F. Anderson–PRESIDING

CENTURY FARM AWARD

BOARD OF CONTROL RECOGNITION OF FORMER COMMISSIONER OF AGRICULTURE
Shirley Ferris

THE SAMUEL W. JOHNSON MEMORIAL LECTURE
Ralph L. Snodsmith
Author, "Tips from the Garden", publisher of "The Garden Hotline Newsletter", and host of "The Garden Hotline"
"Keeping America Green and Growing"

REMARKS
Jack Bush
President, Experiment Station Associates

SHORT TALKS

10:15 *Control of Invasive Aquatic Weeds in Connecticut Lakes* Jason C. White & Gregory J. Bugbee
Freshwater lakes are one of Connecticut's most precious natural resources. Recent introductions of nonnative weeds such as milfoil and fanwort cause lakes to rapidly deteriorate. Station scientists have begun assessing the extent of these weed problems, comparing water quality with weed growth and testing controls such as targeted herbicides, mechanical harvesting, and hydroraking.

1:15 *West Nile Virus: a four year perspective, 1999-2002* Theodore G. Andreadis
A review of the status of West Nile virus in North America and a discussion on the current knowledge on its biology, ecology, and epidemiology in Connecticut.

2:15 *The Arsenic Phase Out in Pressure Treated Wood* David E. Stillwell
The most common wood preservative formulation in present day use is CCA (containing copper, chromium, and arsenic). Nonetheless, findings that arsenic leached and dislodged from this wood has prompted a phase out on its sale, effective January 1, 2004. The focus will be on what the findings were which led to the phase out, what are the alternative products, and what is known about the effects of coating the wood to minimize arsenic leakage to the environment.

2:45 *How far does wind move corn pollen?* Donald E. Aylor
In corn, aerial dispersal of pollen is the main way that genetic information moves between plants in different cornfields. We are developing a quantitative model of pollen movement in the atmosphere to help evaluate the possibility of pollen from genetically-modified corn inadvertently crossing with organically-grown or conventionally-grown corn in nearby fields.

DEMONSTRATIONS

10:45 *Basic Techniques for Propagating Plants* Sharon M. Douglas
The basic techniques used to propagate many common indoor and outdoor plants will be demonstrated. Among the techniques to be covered are leaf cuttings, stem cuttings, simple layering, and air layering.

1:45 *Homeowner Tree Care Tips* Jeffrey S. Ward
Practical tips for home tree care will be demonstrated. These will include how to inspect your trees and shrubs for problems and some advice on simple treatment methods that can be accomplished by a homeowner

STATION WEB PAGE

The Experiment Station has a world wide web page at: WWW.CAES.STATE.CT.US

BARN EXHIBITS

AERIAL APPLICATION OF PESTICIDES: GET THE DRIFT?

Department: Analytical Chemistry and Plant Pathology and Ecology
Principal investigators: James A. LaMondia and Francis J. Ferrandino (Plant Pathology and Ecology) and Mary Jane Incorvia-Mattina, David E. Stillwell, and Walter J. Krol (Analytical Chemistry), Assisted by T. Arsenault, J. Canepa-Morrison, C. Cheah, M. Frost, R. Hiskes, R. Horvath, W. Iannucci-Berger, S. Lamoureux, R. Morrison, C. Musante, J. Parent, J. Simmons, M. Solek, and R. Thibodeau Special thanks to Enfield Shade Tobacco LLC and helicopter pilot Chuck Weber.
Because of concerns about the extent of pesticide drift, we initiated a research program to determine how far and to what extent helicopter delivered fungicides drift off target. We examined 1,600 samples collected on 10 sample dates. Almost all (99.6%) of the applied pesticide was deposited within 25 feet from the edge of the field and measured concentrations beyond this distance were never more than trace level.

REGULATING PLANT GENE EXPRESSION WITH MICRO RNA

Department: Biochemistry and Genetics
Principal investigator: Neil A. McHale. Assisted by C. Clark and R. Huntley
Growth and development of plants requires that genes be turned on or turned off in a very precise manner. A new mode of gene regulation was discovered this year involving microRNA molecules, which move throughout the plant in the vascular+6r system.

PLANT HEALTH CARE FOR THE CONNECTICUT NURSERY AND LANDSCAPING INDUSTRIES

Department: Entomology
Principal investigator: Timothy 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. Two recent publications related to plant health care issues, and an on-going transplant survival experiment, have targeted that landscaping industry and gardening public.

HOST-TARGETED CONTROL OF THE BLACKLEGGED TICK

Department: Forestry and Horticulture
Principal investigator: Kirby C. Stafford III, Assisted by H. Stuber, J. Barsky, S. Williams, C. Stoehr, E. Avery, and E. Schaeffer
The topical treatment of white-tailed deer and white-footed mice has been studied for the control of Ixodes scapularis. Use of the pesticide treatment station termed the “4-poster” has resulted in a 64% decline in the population of nymphal ticks in a community in Old Lyme, CT. The treatment of mice with fipronil through a bait box has reduced tick populations on Mason’s Island (Stonington) and a commercial version is being evaluated in the towns of Westpost, Weston, Gronton, Salisbury, Canaan, and Cornwall.

DETECTION OF WATER BORNE MICROSPORIDIA IN SURFACE WATER

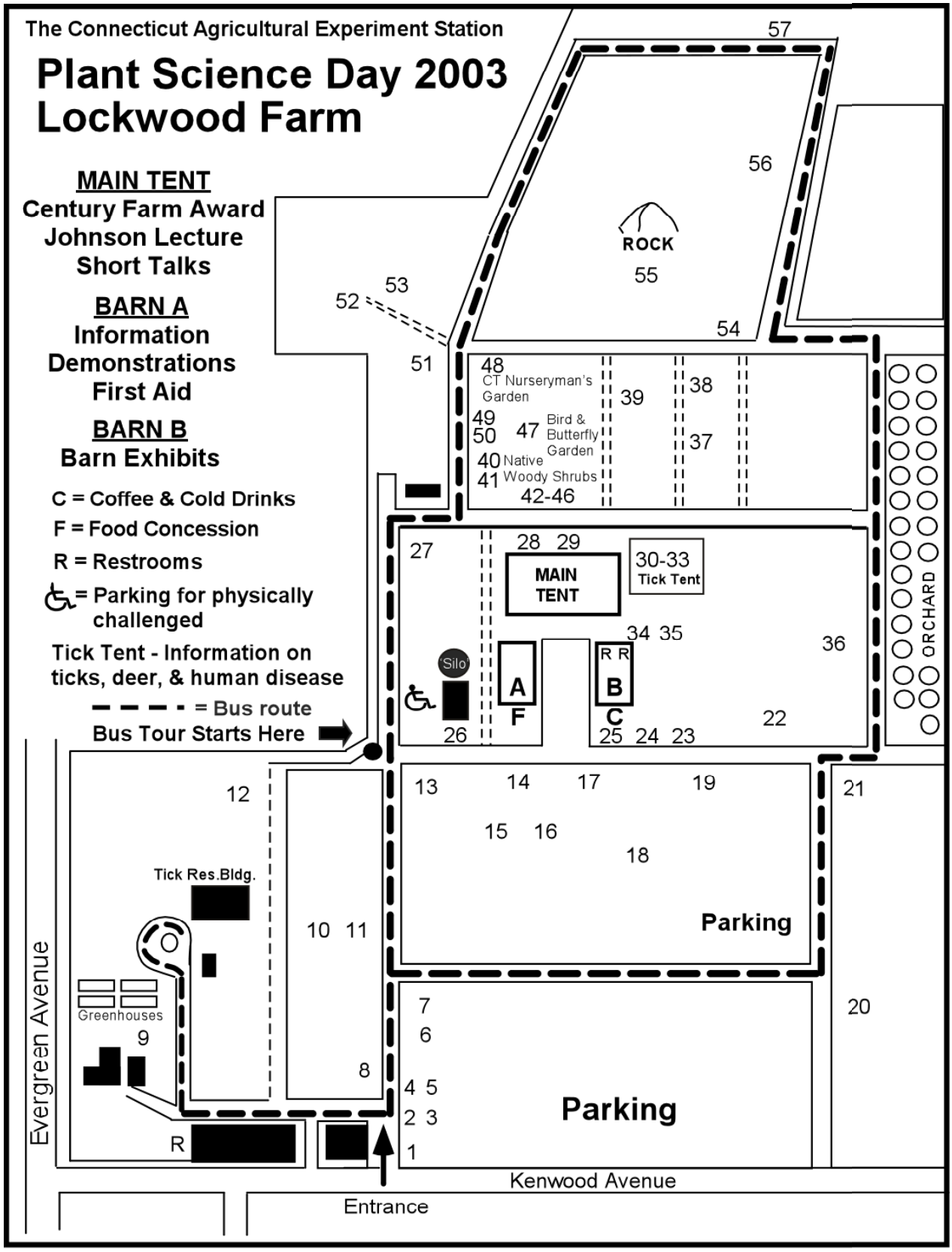
Department: Soil and Water
Principal investigator: Charles R. Vossbrinck
As water borne diseases are detected in humans, the United States Environmental Protection Agency mandates studies to develop methods for detecting the organisms which cause these diseases in water. Microsporidia are one such water borne pathogen, which infect humans with compromised immune systems (organ recipients and AIDS patients). We have been developing a method of detecting Microsporidia in surface water.

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


The Connecticut Agricultural Experiment Station
Plant Science Day 2003
Lockwood Farm
MAIN TENT
Century Farm Award
Johnson Lecture
Short Talks
BARN A
Information
Demonstrations
First Aid
BARN B
Barn Exhibits
C = Coffee & Cold Drinks
F = Food Concession
R = Restrooms
= Parking for physically challenged
Tick Tent - Information on ticks, deer, & human disease
= Bus route
Bus Tour Starts Here
ROCK
CT Nurseryman's Garden
Bird & Butterfly Garden
Native Woody Shrubs
MAIN TENT
Tick Tent
Silo
ORCHARD
Tick Res.Bldg.
Greenhouses
Parking
Parking
Evergreen Avenue
Kenwood Avenue
Entrance
Map Not to Scale

FIELD PLOTS

1. Chinese Chestnut Trees
2. Sheet Composting With Oak and Maple Leaves
3. Maxixi
4. Annual Culture of Globe Artichokes
5. Jilo Trials
6. Using Compost to Control Weeds and Diseases in Tomato Production
7. Utilization of Compost in Butternut Squash Production
8. Calabaza Squash Trials
9. Effect of Shade on Quality of Greenhouse Tomato
10. Effect of Beneficial *Fusarium* Species and sodium chloride on *Fusarium* Crown and Root Rot of Asparagus
11. Utilization of Compost in Onion and Leek Production
12. Disease-Resistant Apple Trial
13. Wine Grape Trial
14. Composting Leaves Using the Static Pile Method
15. Control of Blight on American Chestnuts
16. New Hybrid Chestnut Orchard
17. Question and Answer Tent
18. Long Term Effects of Green Manures on *Verticillium dahliae* on Potato, Tomato, And Eggplant
19. Foreign Insects That Threaten Landscape and Orchard Plants
20. Orchard Chestnuts
21. Phytoremediation of Agricultural Soils Contaminated With DDE
22. Survival Of Corn Pollen in the Atmosphere
23. Experiment Station Associates
24. Bioremediation of Coal Tar Contaminated Soil
25. Mosquito Surveillance for West Nile Virus
26. Verizon Telephone Transmission Silo
27. Minimum Fertilization for Home Gardens Amended by Leaf Compost
28. The Effect of Endophyte Presence on White Grub Populations
29. Protecting Connecticut’s Lakes and Ponds from Nonnative Weeds
30. Lyme Disease in Ticks from Connecticut Citizens

31. The “Deer” Tick *Ixodes Scapularis*
32. Widespread Occurrence of Tick-Borne Agents
33. Non-Lethal Reproductive Control of White-Tailed Deer
34. Connecticut Weeds and Wild Plants
35. Biological Control of Hemlock Woolly Adelgid
36. The Sound School Agricultural Program
37. Biological and Chemical Control of Fusarium Rot of Gladiolus
38. Fusarium Wilt of Herbs
39. Control of Tomato Powdery Mildew With Milk
40. Native Woody Shrubs
41. The State Forest Centennial Image Collection
42. Division of Forestry – Connecticut Department of Environmental Protection
43. Organic Agriculture and Land Care in Connecticut
44. Connecticut Farmland Trust
45. Southwest Conservation District
46. Connecticut Fund for the Environment
47. Butterfly and Bird Garden
48. Connecticut Nurserymen's Garden
49. Nursery and Bee Inspections
50. How Do Disease-Causing Bacteria Evolve?
51. Chestnut Species and Hybrids
52. Dense Planting of American Chestnuts
53. Dwarf Hybrid Chestnut Trees
54. Cover Crops for Vegetable Growers and Their Effects on Pest Management
55. Northeast Apple Variety Trial
56. Rocky Hill American Chestnut Trees
57. Specialty Fruit Variety Trials

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: Z. DeBaise, J. Powe, and K. Powe.

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

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 1995-2002 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 with the same crops this year.

3. MAXIXI

D. Hill

Maxixi (pronounced ma-she-she) is a semi-tropical cucumber grown mostly in South America. The fruit is commonly pickled or eaten raw in salads. It is highly prized by members of the Brazilian community in the Waterbury-Danbury area. Last year, we collected seeds from plants donated by a Bethel grower. This year we are testing the yield and quality of fruit from plants grown with black plastic mulch to warm the soil compared to plants grown without mulch.

4. ANNUAL CULTURE OF GLOBE ARTICHOKES

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 artificially induced vernalization (refrigerated cool, moist treatment) and use of gibberellic acid, a natural plant hormone, to induce budding. In 2002, 80% of Emerald and 48% of Green Globe plants from the 2001 crop survived the extremely mild winter. From these 2-year old plants, Emerald produced 5.0 buds/plant and Green Globe 5.2 buds/plant. In the new 2002 planting, grown from seeds, Emerald produced 2.0 buds/plant and Green Globe 2.5

buds/plant. Low yield in the 2002-seeded crop was due to devernalization of 55% of plants during 3 consecutive days of 90F temperatures in May while plants were in a cold frame.

5. JILO TRIALS

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 stews (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 4,500). 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. In 1999, production fell to 2 lb/plant because no fruit were set in July and August because of drought. In 2002, some plants were grown in compost-amended soil to improve the moisture holding capacity of the soil and others with drip irrigation to insure a constant supply of water when droughty periods occur. Average yield under drip irrigation was 6.6 lb/plant and 5.9 lb/plant with compost amendments compared to 2.7 lb/plant in unamended plots with no irrigation. This experiment is being repeated this year.

6. USING COMPOST TO CONTROL WEEDS AND DISEASES IN TOMATO PRODUCTION

A. Maynard

Utilization of fungicides and herbicides are two choices that growers have to control weeds and diseases in tomato production. These options are not available for organic growers and impractical for those who grow many crops on a few acres. This experiment will determine the effectiveness of mature or immature leaf compost on weed control and increased disease resistance in tomato production and the effect on yields. The 5 treatments include mature compost incorporated into the soil, mature compost mulch, mature compost incorporated plus mature compost mulch, immature compost (undecomposed leaves) mulch, and unamended control. Last year, the greatest yields were from plots amended with mature compost incorporated into the soil with the smallest yields from plots amended with mature compost mulch. Because of the droughty conditions last year, diseases and weeds were not on any of the treatments. These treatments, also repeated at the Valley Lab in Windsor, will be continued annually on the designated plots for three consecutive years.

7. UTILIZATION OF COMPOST IN BUTTERNUT SQUASH PRODUCTION

A. Maynard

Virtually no research has been done utilizing compost on crops with long-term fertility requirements such as winter squash. Even though encouraging data exists on the benefits of using compost, most growers want data that is local and specific to the type of crops they are growing. To determine the rate of inorganic fertilizer needed with leaf compost for optimum production of butternut squash, I am comparing yields of butternut squash being grown under 3 leaf compost/fertilizer combinations to an unamended control fertilized at the full rate of 10-10-10 fertilizer (1300 lb/A). For the second year in a row, the greatest yields of squash were from plots amended with compost and the full rate of fertilizer Yields from these plots were similar to the unamended full-fertilized control plots. The treatments will be repeated annually on the designated plots for three consecutive years to observe any cumulative effect of the compost additions. This experiment is also repeated at the Valley Laboratory in Windsor.

8. CALABAZA SQUASH TRIALS

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 in Connecticut. 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. In this trial, we are testing three short-vine cultivars (12-18 feet long), El Dorado, and La Estrella from Florida, and PR Shortvine developed in Puerto Rico. These are compared to La Primera, a standard long-vine variety from Cuba. In 2002, average yields at Windsor and Mt. Carmel of short-vined cultivars, El Dorado, La Estrella, and PR Shortvine were 35.0, 26.0, and 31.6 tons/A compared to 41.6 tons/A for long-vined La Primera. Although yield was greatest for La Primera, their vines averaged 24 feet in length compared to 13 feet for the short-vined cultivars. Short-vined cultivars used 40% less space than La Primera, a feature more appealing to growers with limited space. This year we are growing the short-vined cultivars with black plastic to speed maturity.

9. EFFECT OF SHADE ON QUALITY OF GREENHOUSE TOMATO

M. Gent *Assisted by* M. Short, J. MacDonald

In some years we have shaded the greenhouses when growing hydroponic tomatoes, and in some years we have not. The total yield and fraction of tomatoes that were marketable, or without visible defects, differed depending on whether the greenhouses were shaded or not. However, marketable yield could have been affected by variation in other climatic and horticultural conditions from year to year. 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. In addition to yield and characteristics of the tomato fruit, we measure various other factors that are affected by shade. These factors include the temperature of the air and the plants, humidity, and the ratio of total to photo-synthetically active light. We also determine how the rate of uptake of water and nutrients is affected when the plants are grown under the different light conditions.

10. EFFECT OF BENEFICIAL *FUSARIUM* SPECIES AND SODIUM CHLORIDE ON FUSARIUM CROWN AND ROOT ROT OF ASPARAGUS

W. Elmer *Assisted by* E. O'Dowd and D. Williamson

Nonpathogenic strains of *Fusarium oxysporum* have shown promise in suppressing *Fusarium* diseases of many plants. These plots were designed to evaluate the potential of these strains for suppressing Fusarium crown and root rot of asparagus. Three strains are being evaluated alone and in combination with NaCl for their usefulness in increasing yield and suppressing Fusarium crown and root rot. Yield data accumulated over three years are presented.

11. UTILIZATION OF COMPOST IN ONION AND LEEK PRODUCTION

A. Maynard

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 shaft. 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 will be compared to the unamended control plots. In addition, the length of the blanched shaft in the leeks will be measured. This experiment, also repeated at the Valley Lab in Windsor, will be continued annually on the designated plots for three consecutive years.

12. DISEASE-RESISTANT APPLE TRIAL

V. Smith

This planting represents a comparison of disease-resistant cultivars released by the New York State Agricultural Experiment Station in Geneva. The planting of disease-resistant apples can drastically reduce the use of fungicides. The cultivars are planted in four replications with four trees of each cultivar. The only commercial disease-resistant New York cultivar in this study is Liberty, which performs well but is susceptible to sooty blotch late in the season. Several next-generation, disease-resistant cultivars such as Redfree, Dayton, and Enterprise from the Purdue-Rutgers-Illinois breeding program have been planted in the border row and represent an improvement over the earlier releases.

13. WINE GRAPE TRIAL

Wine grape cultivars have been tested in Connecticut to identify which are hardiest and of acceptable quality for producing fine wine. This replicated planting compares the cultivars Chambourcin, Villard Noir, Seyval, and Villard Blanc.

14. COMPOSTING LEAVES USING THE STATIC PILE METHOD

A. Maynard

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.

15. 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.

16. 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 between 1990 and 2002. 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.

17. QUESTION AND ANSWER TENT

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

Ask questions about plants, soils, and insects here.

18. LONG TERM EFFECTS OF GREEN MANURES ON *VERTICILLIUM DAHLIAE* ON POTATO, TOMATO, AND EGGPLANT

F. Ferrandino

The soilborne fungus *Verticillium dahliae* causes a wilt disease for all crops in the tomato family (potato, pepper, and eggplant). This seriously limits production when plants in this family are repeatedly grown in the same soil. Certain green manure cover crops in the cabbage family (kale, mustard, collards, and canola) have been shown to reduce the effects of this disease. This plot is set up to test the longevity of the beneficial effect of green manures.

19. FOREIGN INSECTS THAT THREATEN LANDSCAPE AND ORCHARD PLANTS

C. Maier *Assisted by* T. Zarrillo, R. Tomlinson, and M. Lowry

We are evaluating the pest potential of three introduced insects by determining their distribution, hosts, and period of adult activity. The small Japanese cedar longhorned beetle, *Callidiellum rufipenne*, attacks stressed coniferous landscape plants, such as arborvitae, false cypress, and juniper, in Connecticut and nearby eastern states. Its adults are active from April to mid-June. The Asian apple tortrix, *Archips fuscocupreanus*, has an exceptionally broad host range, eating at least 87 species in 15 plant families. This moth species is restricted to coastal counties in Connecticut and nearby eastern states. The caterpillar injures blossoms and foliage of unsprayed apple trees during April and May. Adult activity occurs in June and July. Another apple pest, the Eurasian green pug, *Chloroclystis rectangulata*, attacks apple and a few of its close relatives in northeastern North America. The caterpillar consumes apple blossoms in late April and May, and the adult flies between late May and mid-July. Thus far, only the small Japanese cedar longhorned beetle has caused economically important injury in Connecticut. We continue to monitor these three imported pests to detect changes in their distribution and pest status.

20. 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.

21. PHYTOREMEDIATION OF AGRICULTURAL SOILS CONTAMINATED WITH DDE

J.C. White, *Assisted* by L.T. Wagner and L. Pasniewski

DDE is the main breakdown product of DDT and both compounds are persistent organic pollutants (POPs). Field experiments previously conducted to investigate the effect of common plants (rye, alfalfa, mustard, vetch, clover, spinach, squash, pumpkin, melon, cucumber) on the fate and behavior of weathered residues of DDE have indicated tremendous species variability in the accumulation of the pesticide residue from soil. Preliminary data has suggested that certain species of summer squash may absorb large quantities of the pollutant into their roots and translocate it throughout their shoots. If certain plants can remove enough of the pollutant, phytoremediation, or plant-assisted cleanup of these residues, may be of practical use for field contaminated soils. This study will assess the DDE remediation potential of a range of plant species either known or suspected as heavy metal phytoremediators. In addition, nutrient additions (nitrogen, phosphorus, both) are being made to assess the impact on DDE uptake by all species tested.

22. SURVIVAL OF CORN POLLEN IN THE ATMOSPHERE

D. Aylor *Assisted by* P. Thiel and M. Cardona

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 managed 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 to survive exposure in the atmosphere, since survival can determine the effective distance of travel of pollen from a source field. In this plot, we are studying the effect of exposure to sunlight, air temperature, and humidity on the survival of corn pollen. Our preliminary data indicate that corn pollen survives well for two hours in moderate temperature and humidity. Since wind can potentially transport pollen several miles in 2 hours, it appears that survival per se may not strongly limit dispersal during moderate conditions.

23. EXPERIMENT STATION ASSOCIATES

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

24. BIOREMEDIATION OF COAL TAR CONTAMINATED SOIL

J. Pignatello *Assisted by* Jun Li

Coal tar is a waste product of manufactured gas process used in the nineteenth and early twentieth centuries. It contains high levels of polycyclic aromatic hydrocarbons (PAHs), many of which are toxic. Coal tar contaminated soils exist at hundreds of former manufactured gas plant sites in the U.S., and inexpensive, minimally-disturbing clean-up technologies are urgently needed. We explored the possibility of using natural soil microorganisms to assist remediation. We collected soil samples from a former plant in Winsted, CT. The samples were mixed with nutrient solutions to provide nitrogen (N), phosphorus (P), potassium (K), and trace metals needed for microbial growth. The soil slurries were shaken for up to 108 days with aeration to supply oxygen. We found that over 90% of PAHs of small-to-medium molecular size disappeared within 30-60 days, suggesting the site-existing microorganisms actively degraded them. That they can persist at the original gas plant site for decades is probably because the soil is depleted in essential nutrients. Our results suggest that providing nutrients to this site might be successful. Our research also found that PAHs of large molecular size are tightly bound to soil particles and probably present a low risk to receptors.

25. MOSQUITO SURVEILLANCE FOR WEST NILE VIRUS

T. Andreadis and J. Anderson *Assisted by* J. Shepard, M. Thomas, B. Hamid, N. Halladay, A. Rahmann, A. Main, T. Goodman, M. Vasil, E. Calandrella, J. Capotosto, S. Finan, R. Ferruci, K. Frank, S. Hubbard, C. Lagoy, C. McGee, L. Napolitano, K. Startz, and S. Thomas.
In 2002, The Connecticut Agricultural Experiment Station trapped and tested 192,412 mosquitoes for West Nile (WN) virus as part of a state wide Mosquito Management Program. A total of 278 isolations of WN virus were obtained from 9 species of mosquitoes collected in 15 municipalities. The majority of the isolations were obtained from mosquitoes collected in densely populated residential locales in southern Fairfield and New Haven counties and the greater Hartford area where the highest rates of dead crow sightings were observed. The detection of WN virus in mosquitoes was consistent in time and space with the incidence of human cases (n = 17). In 2002 WN virus infected mosquitoes were detected 3 weeks prior to the onset of symptoms of the first human case, reinforcing the sensitivity and efficacy of the mosquito surveillance program. Overall, the detection of WNV-infected mosquito pools has proven to be a sensitive indicator of epizootic activity associated with subsequent human disease. WN virus is firmly established in Connecticut and is certain to re-emerge in 2003. Increased activity has been observed in each of the last four years and in 2002 we experienced our largest human outbreak to date. Lower Fairfield and New Haven Counties and the greater Hartford area have been identified as "focal centers" but with the detection of WNV in 110 towns WNV could likely re-emerge anywhere in the state. While the threat of human infection remains low, we are likely to experience more wild bird and domestic animal mortality in the near future. Since the virus could occur anywhere in the state in 2003, the mosquito-trapping program has been expanded to 91 locations. Trapping is conducted daily from June through October to help to provide 1.) Early evidence of WN virus activity within a community, 2.) Information on the abundance, distribution and infection rate in local mosquito populations, and 3.) Data to assess the risk to humans and guide emergency control measures.

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

27. 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.

28. THE EFFECT OF ENDOPHYTE PRESENCE ON WHITE GRUB POPULATIONS
R. Cowles
Plots of turf type tall fescue were established at the Valley Laboratory in Windsor, CT, during 2001. Fungal endophytes were eliminated from the grass seed with heat and fungicide treatment just before planting; endophytic and non-endophytic turf were grown in a balanced design in 4-meter square plots with nine replicates. Pitfall traps were used to evaluate the activity of predators, and the populations of white grub larvae were evaluated in the fall of 2002 by counting their populations from a 6 square foot

section of turf. Oriental, Asiatic garden, and Japanese beetle larval populations were greater in endophytic turf than in non-endophytic turf, whereas European chafer numbers were unaffected. Populations of generalist predators, including ants, spiders, and predatory ground beetles, were unaffected by the presence of endophytes. The increased population of certain species of white grubs in endophytic turf is problematic, as these turf varieties have been developed for their resistance to other insect pests (sod webworm, cutworms, billbugs, and chinch bugs). The cause of the increased numbers of these white grubs is still unknown but is suspected to be the result of greater egg-laying by adult beetles in endophytic turf.

29. PROTECTING CONNECTICUT'S LAKES AND PONDS FROM NONNATIVE WEEDS
G. Bugbee and J. White *Assisted by* B. Drew and L. Wagner
Connecticut is home to hundreds 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 have been studying ways to control these invasive aquatic plants. 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 states aquatic plant communities. At this exhibit you will see examples of the invasive weeds, maps of recently studied lakes and the Stations new aquatic plant surveillance boat.

30. LYME DISEASE IN TICKS FROM CONNECTICUT CITIZENS
J. Anderson *Assisted by* B. Hamid, E. Alves, and M. Varthi
Ticks which have fed on humans are tested for the presence of Lyme disease at the request of municipal health departments. In 2002, 6,432 black-legged, or deer, ticks (*Ixodes scapularis*) were received and 6,207 of those were tested. 28% of the tested ticks carried the Lyme disease organism. Other ticks commonly found in Connecticut are the American dog tick (*Dermacentor variabilis*) and the lone star tick (*Amblyomma americanum*).

31. THE "DEER" TICK *IXODES SCAPULARIS*
K. Stafford *Assisted by* H. Stuber, J.P. Barsky, S. Williams, C. Stoehr, E. Avery, E. Schaeffer, and L. Colligan
The tick *Ixodes scapularis* transmits the agents of Lyme disease, babesiosis, and anaplasmosis (i.e. human granulocytic ehrlichiosis). There were 4,631 cases of Lyme disease reported in Connecticut in 2002, a new record. Observe live and preserved ticks under the microscope. Information on tick-associated diseases, tick bite prevention, and managing tick populations will be available.

32. WIDESPREAD OCCURRENCE OF TICK-BORNE AGENTS
L. Magnarelli, J. Anderson, and K. Stafford III *Assisted by* T. Blevins
Ticks transmit disease organisms that cause Lyme disease (*Borrelia burgdorferi*), human babesiosis (Babesia microti), and ehrlichioses (*Ehrlichia chaffeensis* and *Anaplasma phagocytophilum*). More than 20 years of laboratory analyses of serum samples from white-tailed deer, white-footed mice, horses,

and cattle have revealed that the geographic distributions of *B. burgdorferi* and *A. phagocytophilum* (the causative agent of human granulocytic ehrlichiosis) overlap in many areas of Connecticut, including northern sections of the state. There also is evidence of *B. microti* in northern Connecticut, but this organism seems to be most prevalent in New London County and, to a lesser extent, in Fairfield County. It is expected that the geographic distributions of these pathogens will continue to expand in New England.

33. NON-LETHAL REPRODUCTIVE CONTROL OF WHITE-TAILED DEER

U. Ramakrishnan *Assisted by* S. Williams

The need for non-lethal population control has grown over the past two decades as a decline in hunting and an increase in urbanization have combined to create a large white-tailed deer (*Odocoileus virginianus*) population. We tested a new method of reproductive control where we sterilized large tranquilized bucks. The method was easy to perform and required no surgical equipment. Sixteen males were treated in 2001 and 11 males were treated in 2002. The effects of the treatment appear to be long lasting - we recaptured some of the treated animals at the study site and found that the treated animals were sterile both the first year of treatment and one year after treatment. The treatment did not cause antlers to drop, and antler development of the treated males was normal the year following treatment. Nine of the treated males have been fitted with ear-tag radio transmitters, and behavioral observations of the treated males during the breeding season showed that they continued to engage in mating and mate-guarding behavior. The long-term goal of the application of this sterilization procedure is to control population growth, and we are monitoring for changes in population size. If successful, this technique has applications to deer population control efforts throughout suburban United States where high deer densities are a problem.

34. CONNECTICUT WEEDS AND WILD PLANTS

T. Mervosh *Assisted by* R. Hiskes and 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.

35. BIOLOGICAL CONTROL OF HEMLOCK WOOLLY ADELGID

C. Cheah

Hemlock woolly adelgid (HWA), *Adelges tsugae*, the most serious threat to native eastern and Carolina hemlocks, continues to expand its range southwards, westwards and northwards in the eastern United States. Currently, 15 eastern states from Georgia to New Hampshire are infested with varying severity. Although several chemical control options are available to the homeowner, biological control remains the foremost hope for saving our native forest hemlocks. Several species of predatory Coleoptera are currently under evaluation as potential candidates for biological control of HWA, but only one species, *Pseudoscymnus tsugae*, a tiny specialist predatory ladybeetle from Japan, first studied at the CT Agricultural Experiment Station, has been capable of mass-rearing and release. More than a million *P. tsugae* have been released in 15 states. In Connecticut, approximately 159,000 beetles have been reared and released by the Station at 19 sites and another 10,000 at the Mashantucket Pequot Reservation.

New research is targeted at the development of an artificial diet for mass rearing *P. tsugae* as current production methods are limited by the unpredictable availability of HWA, due to winter mortality. Another project is investigating the advance establishment of *P. tsugae* on other adelgid species, such as balsam woolly adelgid and pine bark adelgid, a potentially important strategy at the

fringes of HWA expansion. The Station is also collaborating with the USDA Forest Service in Hamden in improving colony health and mass rearing methods of several other related predatory ladybeetles (*Scymnus* species) imported from China for biological control of HWA.

36. THE SOUND SCHOOL AGRICULTURAL PROGRAM
C. Mavrelion and Sound School students
The Sound School has an agricultural program for high school students in New Haven. A cooperative arrangement with the Experiment Station allows the students to work on a field plot at Lockwood Farm and to work with Experiment Station scientists in short internships.

37. BIOLOGICAL AND CHEMICAL CONTROL OF FUSARIUM ROT OF GLADIOLUS
W. Elmer *Assisted by* E. O'Dowd and D. Williamson
Fusarium rot of gladiolus is found wherever gladioli are grown. The disease is caused by soilborne species of *Fusarium* and causes a corm rot. These plots are planted with the highly susceptible cultivar 'Purple Passion.' The study is designed to compare several biological control agents with chemical fungicides for their efficacy in reducing the severity of the disease and for enhancing the quality of the flowers. In 2001, the chemical fungicide Medallion provided good suppression of Fusarium corm rot. In 2002, the chemical Actigard, which activates defense mechanisms in plants, was effective. This year, Medallion is being compared to Actigard and to other products.

38. FUSARIUM WILT OF HERBS
W. Elmer *Assisted by* E. O'Dowd and D. Williamson
Basil has become one of the most popular herbs grown in the US. The seedborne disease called Fusarium wilt causes major losses of basil globally. The purpose of this plot is to study the effects of winter cover crops on the suppression of Fusarium wilt. In 2001, the soil was infested with the pathogenic fungus *Fusarium*. Plots were seeded with rye/vetch, clover or rape seed along with bare-ground plots. The plots were then subdivided and planted to basil, parsley, and cilantro in 2002, and to sage, thyme, and dill in 2003. Survival of the pathogen will be studied to determine if winter cropping can suppress this disease.

39. CONTROL OF TOMATO POWDERY MILDEW WITH MILK
V. Smith
Powdery mildew of tomato is a serious disease causing leaf discoloration and defoliation. This study is designed to compare standard methods of controlling the disease with using diluted milk or solutions of lactose to control the disease. Previously, I have found that diluted milk equals fungicide in efficacy of controlling this disease, and that lactose, or milk sugar, also controls disease. Use of milk may be an acceptable organic method of disease control.

40. NATIVE WOODY SHRUBS
J. Ward *Assisted by* J. 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.

41. THE STATE FOREST CENTENNIAL IMAGE COLLECTION
J. Barsky and J. Ward
At the turn of the last century, Connecticut's Forests were quite different than they are today. The charcoal industry was rapidly consuming the mature forest to support the steel industry. Wildfires blazed across the state on regular intervals. However, in some areas, new forests were growing on abandoned farmland. So in 1903, the Experiment Station's first forester, Walter Mulford, acquired the first parcel of the Portland State Forest. For the bargain price $1,110.12, 698½ acres were purchased to demonstrate sound forestry practices to local woodlot owners. One hundred years later, our forests are mature, widespread, and entering into a new era, with new challenges to face. This exhibit displays some of the images taken by the first Station Forester, some images of the current forest research, and a few informative facts about Connecticut's Forest during the last 100 years.

42. DIVISION OF FORESTRY – CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION
Information will be available on state forests and programs to assist landowners with questions on forest management.

43. 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 www.ctnofa.org, www.organiclandcare.net , 203 888-5146 or Box 386, Northford, CT 06472.

44. CONNECTICUT FARMLAND TRUST
C. Weimar
The Connecticut Farmland Trust (CFT) was formed to: 1) Protect Connecticut's remaining farmland for agricultural use by current and future farmers; 2) Enhance agricultural diversity, economic development, environmental quality, and rural character; 3) Assist landowners, local land trusts, towns, and state agencies in protecting agricultural land. Connecticut Farmland Trust accepts donations of farmland and agricultural conservation easements and purchases farmland and agricultural conservation easements. CFT also partners with towns and land trusts to identify threatened farms and opportunities for land protection in communities throughout the state, and to help address farmland stewardship and management concerns. And, CFT encourages local farmland preservation efforts through outreach and support to farmers, local land trusts, town planners, conservation commissions, and community organizations.

45. 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: www.conservect.org.

46. CONNECTICUT FUND FOR THE ENVIRONMENT
D. Lorimier
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.

47. BUTTERFLY AND BIRD GARDEN
Created by Landscape Designer A. Bell, L. Starr, and B. Payton *Assisted by* R. Cecarelli, Lockwood Farm staff, R. Bonito, J. Canepa-Morrison, and J. Fengler, 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.

48. CONNECTICUT NURSERYMEN'S GARDEN
R. Cecarelli
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.

49. NURSERY AND BEE INSPECTIONS
P. Trenchard, S. Sandrey, I. Kettle, and J. Fengler
Our personnel uphold laws by the state legislature enacted to protect Connecticut’s vegetation from injurious insects and disease. Each year we inspect 9,805 acres of nursery stock grown in over 400 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 1,200 beekeepers tending 5,000 colonies of honeybees. 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 honeybees, 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.

50. 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.

51. 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.

52. 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. P.N. Gordon from The American Chestnut Foundation is using these trees now to see what kind of yield of nuts is possible under these conditions.

53. 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.

54. COVER CROPS FOR VEGETABLE GROWERS AND THEIR EFFECTS ON PEST MANAGEMENT

K.A. Stoner and W.H. Elmer *Assisted by* E. Amezzane, T. Zarrillo, M. Lowry, E. O'Dowd, and N. Allen

Vegetable growers use cover crops for a variety of purposes: nutrient management, nitrogen fixation (by legumes), erosion control, building organic matter in the soil, weed suppression, and suppression of soil-borne plant pathogens. In this project, an entomologist and plant pathologist are studying the effects of cover crops (crimson clover, winter rye, rye + vetch, canola, oats) on beneficial and pest insects and on beneficial and deleterious root bacteria. We will have information on beneficial and pest insects, what cover crops they feed on, and when they move from cover crops into neighboring fields.

55. NORTHEAST APPLE VARIETY TRIAL

V. Smith

This planting is one of over 20 in North America used to compare the same new varieties in similar planting. Since pesticide use was restricted, the disease-resistant varieties performed best here. Outstanding for productivity and disease resistance are Enterprise and Royal Gala. Fortune and Fuji performed well among the disease-susceptible varieties. Honeycrisp is a favorite for flavor among taste-testing panels. Ginger Gold is susceptible to late-season fruit splitting.

56. 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. The white paper bags cover the hand-pollinated flowers of this year's crosses. 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.

57. SPECIALTY FRUIT VARIETY TRIALS

A. Maynard

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. In addition, this year, 210 beach plum seedlings have been planted. These were grown at Cornell University from seeds collected from 35 sites from Maine to Delaware. These trees will be evaluated annually and select elite individuals will be propagated as possible cultivars in the future.

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.

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