

## Plant Science Day Field Plots 2002

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## FIELD PLOTS

*The plots at Lockwood Farm are planted and maintained by Experiment Station scientists with the help of Farm Manager E. Naughton, and his staff, R. Cecarelli and R. Hannan, and the following summer workers: M. Nacca, D. Fleischman, and A. Reynolds.*

### 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 1995-2001 and incorporated into the soil by rototilling. Lettuce, tomatoes, eggplant, and peppers were grown from transplants and all plots received 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. 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. This year lettuce, bush delicata squash, and peppers are being grown with the same oak and maple treatments.

### 3. 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. Imperial Star and Emerald have been selected by growers in Southern California and Arizona because they can be vernalized with only 250 hours of temperatures below 50F, which can be accumulated in a cold frame before planting. In 2001, Emerald produced 3.5 buds/plant and Green Globe 4.0 buds/plant for an estimated yield of 15,250 buds/acre and 18,300 buds/acre, respectively. Due to the recent extremely mild winter, 80% of Emerald and 48% of Green Globe survived the winter. We take this rare opportunity to observe perennial production (as in California)

and compare it to annual production in a newly planted crop.

#### 4. 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 this trial, some plants are being 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.

#### 5. USING COMPOST TO CONTROL WEEDS AND DISEASES IN TOMATO PRODUCTION

##### A. Maynard

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. The five 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. Foliar diseases will be monitored and weeds on each plot will be counted 75 days after transplanting. Marketable tomatoes are being harvested weekly until frost. These treatments, also repeated at the Valley Laboratory in Windsor, will continue for three years.

#### 6. 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. Although 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, yields of butternut squash being grown under three leaf compost/fertilizer combinations are being compared to an unamended control fertilized at the full rate of 10-10-10 (1300 lb/A). Last year, 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 years to observe any cumulative effects of the compost additions. This experiment is also repeated at the Valley Laboratory in Windsor.

#### 7. CALABAZA SQUASH TRIAL

##### 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-Short Vine developed in Puerto Rico. These are compared to La Primera, a standard long-vine variety from Cuba. In 2001, yield of short vine El Dorado at two sites, averaged 35.7 tons/acre compared to 35.8 tons/acre for long-vine La Primera. Although yields of both varieties were equivalent, El Dorado plants used 40% less space than La Primera, a characteristic appealing to growers with limited space.

## 8. SWEET POTATO TRIAL

D. Hill

A survey by the Connecticut Department of Agriculture of consumers who purchase vegetables at Connecticut's 65 farmers markets and the 120 growers who supply these markets, identified sweet potatoes as one of the most popular specialty vegetables. They are one of the most nutritious vegetables and are available throughout the year by curing and long-term storage. In prior trials, planted in late-May, we determined that in cultivars with 120-day maturity, over 50% of storage roots failed to reach U.S. #1 grade compared to 25% of storage roots from cultivars with 90-day maturity. In 2001, early-May planting failed to improve the percentage of U.S. #1 roots irrespective of maturity. This year Beauregard and Georgia Jet (90-day maturity) and Centennial and Jewel (120-day maturity) were planted in mid-May from vegetative slips. Half of the slips were covered with Reemay to speed early vine growth

and remained uncovered. An improvement in yield of U.S. #1 roots from 120-day cultivars will broaden the choice of cultivars that can be grown in Connecticut.

## 9. NON-DIETARY EXPOSURE TO PESTICIDES

W. Krol *Assisted by* T. Arsenault

People are exposed to pesticides in many different ways. Pesticides can be found on some of the foods we eat, but they also are present in our environment. These pesticides may be incidentally ingested, absorbed through the skin, or inhaled into our lungs. The possibility that picking strawberries is one route for incidental pesticide exposure is being examined in this plot.

## 10. HYDROPONIC GREENHOUSE TOMATOES

M. Gent *Assisted by* M. Short

There are a wide variety of fertilizer combinations that have been recommended for producing greenhouse tomatoes. It is not clear which combination is optimum for current production methods in the Northeast. The recommendations differ in concentrations of nitrogen, particularly in the fruit production stage, and also in the ratio of nitrogen to potassium. Experiments in 1999, conducted without shade on the greenhouse, showed that additional nitrogen in the form of ammonium nitrate lowered yield and weight per tomato. However, experiments in 2001, conducted with 30% shade on the greenhouses, did not show a detrimental effect of the ammonium form of nitrogen. To see if sunlight intensity plays a role in the sensitivity of greenhouse tomato to nitrogen fertilizer, we are growing the plants without shade. We are comparing both nitrate and ammonium forms of nitrogen as supplements, along with a potassium carbonate supplement. These amended nutrient

solutions are compared to a control solution with standard concentrations of nitrogen and potassium. The plants grow in hydroponics using a rock-wool root medium. Hydroponics is used to control the concentration of nutrients in contact with the roots and measure the uptake by the plants. Twelve different cultivars or varieties are included in the trial. These cultivars differ in size of tomato fruit and in their sensitivity to nitrogen fertilizer.

#### 11. 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 cut 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.

#### 12. EFFECT OF SILICON AMENDMENTS ON ORNAMENTAL GRASS

W. Elmer *Assisted* by E. O'Dowd and A. Kelley

Silicon is not considered a major or minor plant nutrient, but many plant species, such as grasses, respond favorably to silicon amendments. Studies have shown that some plants are more tolerant of drought and diseases when grown with silicon. These pots contain an ornamental grass (cultivar Heavy Metal). The potting mix was amended with six rates of two sources of silicon, rock dust from a local quarry,

and silica slag, a by-product from iron production. Growth and marketability will be monitored.

#### 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. EVALUATION OF ASPARAGUS CULTIVARS FOR CONNECTICUT

W. Elmer *Assisted* by E. O'Dowd and A. Kelley

Many different asparagus cultivars have been developed for different climates around the world. These plots were established to examine the performance of six cultivars that are advertised as being suitable for the New England climate. The planting was established in June 1999. Plots were harvested for marketable yield 15 times in 2002.

#### 15. 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 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 at Lockwood Farm and at the Valley Laboratory in Windsor.

#### 16. 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, MD, and the original tree resisted blight for many years (it may be a European hybrid). It definitely has some resistance, and is the best looking tree in the plot. Two grafted trees at the southeast corner are (*Chinese X American*) X *American* (cultivar Clapper) and have intermediate resistance to blight.

#### 17. NEW HYBRID CHESTNUT ORCHARD

S. Anagnostakis *Assisted by* P. Sletten

These small trees were planted as seedlings in 1990 to 2001. All are hybrids of American chestnut trees and blight-resistant Chinese, Japanese, or hybrid trees. They will be grown to evaluate their blight resistance in the presence of the biological control that we assume will move over from the adjoining plot. The trees that look most like American chestnut trees and have good blight resistance will be used in future crosses for timber trees. Others will be developed as orchard trees for Connecticut growers. The paper bags on

the trees cover hand-pollinated flowers from this year's crosses.

#### 18. QUESTION AND ANSWER TENT

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

Ask questions about plants, soils, and insects here.

#### 19. EFFECTS OF GREEN MANURES ON *VERTICILLIUM DAHLIAE* ON POTATO, TOMATO, AND EGGPLANTS

F. Ferrandino

This plot has been planted to crops susceptible to Verticillium wilt since 1985. In the springs of 1999 and 2000, various green manure crops (canola, rye, oats) were grown and then tilled into this plot. Eggplants, potatoes, and tomatoes showed significant yield increases and reduction in disease symptoms for the plots where canola was used. This effect was still seen last year (2001), although no additional green manure was grown. Yield measurements and symptom evaluation will determine if the beneficial effect of canola lasts 2 years.

#### 20. INTRODUCED INSECTS THAT THREATEN LANDSCAPE AND ORCHARD PLANTS

C. Maier *Assisted by* T. Zarrillo and R. Tomlinson

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 coastal counties of Connecticut and nearby eastern states. Its adults are active in April and May. The eastern Asian



apple tortrix, *Archips fuscocupreanus*, has an exceptionally broad host range, eating at least 87 species in 15 plant families. This moth species also 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.

#### 21. RASPBERRY TRIAL

J. Bravo

The goal of the raspberry trial is to identify varieties that will be productive, of good quality, and will extend the harvest season in Connecticut.

#### 22. ORCHARD OF NUT TREES

S. Anagnostakis *Assisted by* P. Sletten

This orchard of grafted nut trees was planted by Richard Jaynes in spring 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.

#### 23. PHYTOREMEDIATION OF AGRICULTURAL SOILS CONTAMINATED WITH DDE

J. White and X. Wang *Assisted by* M. Reynolds

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. Data has suggested that certain species of summer squash may absorb large quantities 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. The remediation potential of 22 varieties of summer squash is being assessed.

#### 24. SURVIVAL OF CORN POLLEN IN THE ATMOSPHERE

D. Aylor *Assisted by* P. Thiel, L. Seldes, and M. Mays

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. A cornerstone parameter in the model 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, temperature and humidity on the survival of corn pollen.

## 25. EXPERIMENT STATION ASSOCIATES

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

## 26. SPIDERS OF CONNECTICUT

C. Vossbrinck *Assisted by* N. Halladay

Spiders are fascinating arthropods. They are all predators feeding mainly on insects. Almost all species are venomous but almost none (except for the black widow) are poisonous (poisonous meaning that the venom is toxic to humans). Despite this, most people show a fear of spiders referred to as Arachnophobia. Why should we be repelled by spiders if they are not harmful? Spider silk is one of the strongest materials known. The diameter of a thread is 1 micron (1/1000 of a millimeter) and can actually trap birds. Spiders are found in almost every terrestrial habitat and a few live under water in ponds breathing air they have brought down from the surface.

## 27. MOSQUITO SURVEILLANCE FOR WEST NILE VIRUS

T. Andreadis, J. Anderson, and C. Vossbrinck  
*Assisted by* J. Shepard, M. Thomas, B. Hamid, A. Rahmann, K. Blessing, J. Cabral, E. Calandrella, J. Capotosto, E. Carlson, R. Ferrucci, D. Floch, K. Jones, M. Meenaghan, L. Mickowski, A. Pennell, and A. Main.

In 2001, The Connecticut Agricultural Experiment Station trapped and tested 190,692 mosquitoes for West Nile (WN) virus as part of a state wide Mosquito Management Program. Fifty-three isolations of WN virus were obtained from a record 14 species of mosquitoes collected from 19 locations in 15 municipalities. The majority of the isolations were obtained from mosquitoes collected in densely populated residential areas in southern Fairfield and New Haven counties where the highest rates of dead crow sightings

were observed and where WN virus activity was detected in the previous year. The detection of WN virus in mosquitoes was consistent with the incidence of human (n = 6, 1 fatality) and horse cases (n = 11, 4 fatalities). In 2001 WN virus infected mosquitoes were detected 7 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 appears to be firmly established in Connecticut and is almost certain to re-emerge in 2002. Increased activity (i.e. number and variety of mosquito isolates, horse and human cases) has been observed in each of the last 3 years and in 2001 we experienced our first human fatality. Lower Fairfield and New Haven Counties have been identified as “focal centers” but with the detection of WNV in 110 towns WNV could 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 2002, 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.

## 28. TELEPHONE TRANSMISSION SILO

Learn about the cellular transmission tower.

## 29. FUSARIUM WILT OF PUMPKIN

W. Elmer *Assisted by* E. O'Dowd and A. Kelley

Fusarium wilt of pumpkin has been appearing more frequently in New England over the past few years. The pathogen is a fungus that can affect the seedling but more often causes lesions on the rind of the pumpkin. These microplots are designed to determine if seed from infected pumpkins will produce infected plants. This information may implicate seed as a source of inoculum.

## 30. 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.

## 31. STRAWBERRY VARIETAL RESISTANCE TO BLACK VINE WEEVIL

R. Cowles

Black vine weevil (BVW) can be a serious pest in strawberry plantings. After emergence,

adults feed on foliage for a month before laying eggs. Eggs hatch in the soil and the larvae spend the fall and spring feeding on the root and crown tissue. Several varieties of strawberries ('Allstar,' 'Annapolis,' and 'Cavendish') appear to survive better than others ('Honeoye' and 'Kent') under conditions of high BVW populations in commercial fields. Laboratory studies examined the differences in acceptance of leaf disks by BVW adults in choice tests. Stripping leaf hairs with adhesive tape determined that hairs on most, but not all, strawberry varieties mediated detergency. In another test, the survival of BVW larvae was compared among 21 varieties of strawberries. The larval survival data indicated that there was no significant plant variation for resisting BVW larval feeding. Differences observed in survival of strawberry varieties is probably mediated by (1) vigor of the plants and their ability to grow an extensive root system (determining whether crown feeding will take place), and (2) acceptability of foliage for adult BVW feeding (determining where eggs are laid). These results may provide a starting point for further plant breeding to improve strawberry resistance to black vine weevil.

## 32. EXOTIC WEEDS THREATEN OUR LAKES

G. Bugbee and J. White. *Assisted by* M. Hood and M. Reynolds

Non-native aquatic plants such as Eurasian watermilfoil and cabomba spread rapidly because of few natural controls. These weeds can limit recreation, crowd out native vegetation, disrupt water supplies and decrease property values. Through surveillance, in-lake weed control experiments, and public outreach, station scientists are working to find methods for controlling these weeds. Current work includes testing the effectiveness of herbicide spot treatments in Bashan Lake, East Haddam and

Lake Quonnipaug, Guilford. Weed problems in Moodus Reservoir in East Haddam are being studied to determine how they relate to water quality and land use.

### 33. LYME DISEASE IN TICKS FROM CONNECTICUT CITIZENS

J. Anderson *Assisted by* B. Hamid, B. Zolla, A. Bliss

Ticks that have fed on humans are tested for the presence of Lyme disease at the request of municipal health departments. In 2001, 5,849 black-legged or deer ticks (*Ixodes scapularis*) were received, and 5,592 of those were tested. 26% 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*).

### 34. CATTLE ARE EXPOSED TO AGENT OF EHRLICHIOSIS

L. Magnarelli, J. IJdo (Yale University), B. Sherman (CT. Dept. of Agriculture), S. Busmich (University of CT), S. Levy (Durham Vet. Hospital), and E. Fikrig (Yale University) *Assisted by* T. Blevins

At the request of a dairy farmer, a study was conducted to determine if cattle living in tick-infested areas were exposed to the agent that causes granulocytic ehrlichiosis. Of the 339 serum samples tested, 40 (12%) were positive for antibodies by an enzyme-linked immunosorbent assay. Cattle were exposed to the disease agent and should be tested for granulocytic ehrlichiosis if there are marked declines in red blood cells, white blood cells, or platelets or if there is unexplained decreased milk production.

### 35. THE “DEER” TICK *IXODES SCAPULARIS*

K. Stafford *Assisted by* H. Stuber, J. Barsky, L. Curtis, C. Stoehr

The tick *Ixodes scapularis* transmits the agents of Lyme disease, babesiosis, and anaplasmosis (i.e. human granulocytic ehrlichiosis). There were 3,560 cases of Lyme disease reported in Connecticut in 2001. Observe live and preserved ticks under the microscope. Information on tick-associated diseases, tick bite prevention, and managing tick populations will be available.

### 36. EVALUATION OF NEW TACTICS FOR THE CONTROL OF THE “DEER” TICK

K. Stafford *Assisted by* H. Stuber, J. Barsky, L. Curtis, C. Stoehr

Evaluation of a new biopesticide product containing the insect pathogenic fungus *Metarhizium anisopliae* began in Connecticut in 2002 for the control of the deer tick, *Ixodes scapularis*. Available in an oil and granular formulation and applied to the landscape like a chemical pesticide, spores of the fungus germinate after contacting the tick, grow, and kill the tick. Trials of the new fipronil-based rodent bait box (Maxforce TMS), now available commercially, were continued in Connecticut as part of Lyme disease community intervention programs. A five-year, five-state regional study of the 4-poster device for the topical application of a pesticide to white-tailed deer to control ticks was completed this year. The results of the fungus, rodent-bait box, and deer 4-poster trials are presented. Biological and host-targeted approaches to tick control may offer an alternative or adjunct to the use of synthetic chemicals in a residential tick management program.

### 37. COYOTE DIET AND VISITATIONS TO SCENT STATIONS

U. Ramakrishnan *Assisted by* S. Williams

In Connecticut, the only non-human predator capable of taking down an adult white-tailed deer is the coyote. To determine the influence of white-tailed deer on the coyote diet, we monitored the diet and movement of coyotes at Lake Gaillard. Coyote diet was analyzed by examining coyote scat. Over 100 scat samples have been collected so far. Sixty-five percent of the scat samples analyzed contained deer hair, indicating that deer are one of the primary prey of coyotes. To monitor the abundance and spatial and temporal movements of coyotes, we used odor-based scent-stations coupled with infrared-triggered motion cameras, which recorded coyote visitations to the station. Each station was composed of a wooden stake about 8" high, with the attached attractant. We tested three different attractants—coyote urine bought from commercial trappers, catfish bait and sardines. Sardines were the most effective attractant for coyotes. Using images captured on film, we determined the frequency of coyote visitations over the different seasons as well as documented species that were attracted to the bait.

### 38. MEASUREMENT OF DEER BROWSE DAMAGE

U. Ramakrishnan *Assisted by* S. Williams

White-tailed deer have been known to alter the structure and composition of forest ecosystems, and in regions of high deer density, browsing and grazing by deer cause serious impacts on the regeneration, abundance and distribution of plant species. We are monitoring the long-term effects of deer browse on the species composition and distribution of plant species at Lake Gaillard. Lake Gaillard has a high deer density, with more than 60 deer per square mile. Eighteen 33 x 33 ft

plots were set up throughout the lake in April 2001. Nine of the plots are protected with fencing that excludes deer, nine others are unprotected, allowing deer access to the plots. The diameter at breast height (dbh) and species of all trees (stems > 3.5 inch dbh) were identified to establish relative tree density and dominance within each plot. All saplings (stems > 0.4 inch and < 3.5 inch dbh) inside the plots were also identified and tagged. All plants were then classified into the following categories – saw timber (dbh of 10 inch +); pole timber (4-10 inch); saplings (1.2-4 inch) and seedlings (0.4-1.2 inch). Data analysis has revealed a shift in the forest species composition from primarily maple, oak, and hickory to species of low economic and wildlife value such as black birch, hophornbeam and black cherry. Each year, the species as well as the number of new seedlings within each plot will be documented to quantify sapling recruitment.

### 39. PLANT HEALTH CARE FOR THE CONNECTICUT NURSERY AND LANDSCAPING INDUSTRIES

T. Abbey *Assisted by* R. Hiskes

Plant health care for ornamental plants is a management strategy that includes traditional pest management but also emphasizes proper plant selection, planting procedures, and plant maintenance (pruning, watering, etc.). Two projects focus on these components of plant health care. They are: development and publication of a brochure to educate consumers about native, non-invasive ornamental plant species; and evaluation of mycorrhizal fungi, biostimulants, and planting gels on the establishment and growth of four woody ornamental plant species.

#### 40. NEMATODE MANAGEMENT ON HERBACEOUS PERENNIAL ORNAMENTALS

J. LaMondia *Assisted by* J. Canepa-Morrison

The northern root-knot nematode *Meloidogyne hapla* is an important pathogen of herbaceous perennial ornamental plants in the northeastern United States. Of particular concern is the fact that this microscopic plant-parasitic worm is commonly found in plant propagation material. In field microplots, nematode infection of several species resulted in root galling but shoots were not affected in the first year. Plant vigor and shoot weights were reduced in the second year. Ninety-eight cultivars representing 96 species in 84 genera were screened for host status to *M. hapla*. Thirty were resistant (no galls or egg masses), and 47 were susceptible (more than 10 galls/plant). Removal of the fine feeder roots from nematode-infected propagation material greatly reduced or eliminated root-knot from plants. Additionally, nematode populations in soil were reduced below detection levels following 6 months of rotation with resistant plants such as Aster or Rudbeckia. An integrated management program involving inspection and sanitation, pruning of feeder roots prior to planting propagation material, and rotation to *M. hapla*-resistant plants has been developed to control this nematode.

#### 41. 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.

#### 42. 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.

#### 43. FUSARIUM WILT OF BASIL

W. Elmer *Assisted by* E. O'Dowd and A. Kelley

Basil has become one of the most popular herbs grown in the United States. The seedborne disease called Fusarium wilt causes major losses of basil globally. In 2001, the soil was infested with the pathogenic fungus *Fusarium*. Plots were seeded with rye/vetch, clover, or rape seed or left bare. The plots were subdivided and planted to basil, parsley, and cilantro. Population dynamics of the pathogen will be studied to determine if winter cropping can suppress this disease.

#### 44. BIOLOGICAL AND CHEMICAL CONTROL OF FUSARIUM ROT OF GLADIOLUS

W. Elmer *Assisted by* E. O'Dowd and A. Kelley

Fusarium rot of gladiolus is found wherever gladiolus are grown. The disease is caused by a soilborne species of *Fusarium* and causes a corn 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 corn rot. This year Medallion is being compared to other products.

#### 45. UTILIZATION OF COMPOST IN ROOT CROP PRODUCTION

A. Maynard

While adding 1-inch of leaf compost annually is usually not a hardship for the home gardener, for the commercial grower, with acres under cultivation, obtaining and applying that amount of compost is sometimes difficult. In this 3-year experiment, three different root crops are being grown in soil amended with varying amounts of leaf compost to determine the least amount of compost that is effective. The root crops include beets, carrots, and turnips. All plots receive the same amount (1300 lb/A) of 5-10-10 fertilizer. Germination percentage and yield from the various compost treatments will be compared to the unamended control plots. Last year, the greatest carrot and beet yields were from plots amended with either 1-inch or one-half inch of compost while only plots amended with 1-inch of compost produced the greatest turnip yields. This experiment is also repeated at the Valley Laboratory in Windsor. This is the final year of the experiment.

#### 46. EFFECT OF TRELLISING ON SEVERITY OF TOMATO POWDERY MILDEW

V. Smith

More and more tomato growers are using the trellis system to grow their crops. Trellising keeps plants growing upright and off the ground, and is considered to be easier to set up than staking. In this plot, the influence of a trellis system for tomatoes on foliar diseases such as powdery mildew, early blight, and Septoria leaf spot is being evaluated. Better Boy tomatoes have been pruned to two or three stems, and most suckers have been removed. The trellis was introduced

2 weeks after planting. Data on foliar disease severity and fruit yield is being collected.

#### 47. 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.

#### 48. NATIVE WOODY SHRUBS

J. Ward *Assisted by* J. Barsky, A. Shutts, and J. Rawson

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, spiraea, and buttonbush, flower in summer. Witchhazels flower in early autumn. Birds are frequent visitors to the garden and quickly eat the mature fruit. These shrubs survive with minimal maintenance. Occasional mowing, annual removal of dead stems, and replenishment of mulch are performed. These shrubs have never been fertilized, watered, or treated for disease.

#### 49. 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.

#### 50. NORTHEAST ORGANIC FARMING ASSOCIATION OF CONNECTICUT

Learn about the work of this organization in organic farming and land care.

#### 51. NATURAL RESOURCES CONSERVATION SERVICE

Learn about this government organization dedicated to protecting soil, water, and other natural resources.

#### 52. CONNECTICUT FUND FOR THE ENVIRONMENT

Learn about this environmental organization.

#### 53. BUTTERFLY AND BIRD GARDEN

Created by Landscape Designer A. Bell, L. Starr, and B. Payton *Assisted by* E. Naughton, and Lockwood Farm staff, C. Lemmon and R. Bonito, maintained by the Spring Glen Garden Club.

The garden is a joint project of The Experiment Station and the Federated Garden Clubs of Connecticut. The butterfly and bird garden can be viewed as well as 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.

#### 54. CONNECTICUT NURSERYMEN'S GARDEN

E. Naughton

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.

#### 55. NURSERY AND BEE INSPECTIONS

C. Lemmon *Assisted by* D. Brown, 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 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 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.

#### 56. CAN THE ACTIVITY OF THE GYPSY MOTH FUNGUS BE PREDICTED?

R. Weseloh *Assisted by* M. Lowry

A computer model that simulates the infection of gypsy moths by a fungus (*Entomophaga maimaiga*) has been developed. This year, information about weather conditions, overwintering fungal abundance, gypsy moth abundance, and infection rates of gypsy moths in 10 plots in Connecticut is being used to determine how well the model simulates reality. A reliable



model will help show how different conditions affect infection by the fungus, aid in predicting future impacts, and help in revealing the way the fungus spreads. Comparisons of model outputs with actual forest results will be shown, as well as information about how useful the model is likely to be for forest managers and the general public.

#### 57. ENVIRONMENTAL MICROBIOLOGY: MOLECULAR FINGERPRINTING AND TAGGING OF A BACTERIUM

D. Dingman *Assisted by* C. Musante

To identify and follow a specific bacterium in the environment, procedures to fingerprint and tag the microbe are essential. One way to accurately and easily fingerprint a microbe is to amplify and sequence DNA representing the ribosomal intergenic sequence (ITS). Ribosomal DNA sequences of *Paenibacillus popilliae* have been determined and have been used to help synthesize oligonucleotides for PCR amplification of ITS. *P. popilliae* is the causative agent of milky disease in certain scarab beetle larvae and is a natural inhabitant of the soil. Several ITS regions have been identified for *P. popilliae* Dutky (a strain originally isolated from an unknown source). ITS regions from *P. popilliae* strains obtained from other insect species and other environmental locations will be obtained and compared to ascertain the level to which the various bacterial isolates are related. For tagging purposes, a gene obtained from *P. popilliae* has been fused to the gene for green fluorescent protein (GFP). GFP is encoded by a gene found in the jellyfish (*Aequoria victoria*) and is a protein which fluoresces bright green under ultraviolet or blue light. Insertion of this gene fusion into *P. popilliae* will function as a molecular tag with which to track this bacterium in the environment (i.e., in host disease-initiation steps in the insect intestinal tract). This gene fusion is functional as expressed in the bacterium,

*Escherichia coli*. Efforts to transfer this construct into *P. popilliae* are progressing.

#### 58. SUSCEPTIBILITY OF CHESTNUTS TO POWDERY MILDEW

V. Smith and S. Anagnostakis

American chestnut trees are very susceptible to powdery mildew, while Japanese, European and Asian chestnut trees are more resistant. In this plot, various species of chestnut and their hybrids are being evaluated for level of resistance to powdery mildew. We have found that when trees have more than 50% of their genes from American chestnut, they are very susceptible. However, when crossed with Japanese, European, or Asian species, American chestnuts may gain resistance to this disease.

#### 59. 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 plot 16). Plants of all seven species of chestnut are growing here. In 1994, two seedlings from the Caucasus Mountains of Russia that are true European chestnuts were planted. The cultivar Lockwood is at the southwest corner. Two chinquapin native to Florida are planted across the road.

#### 60. 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 plot 16), and it looks slightly better than the south plot. P.N. Gordon from The American Chestnut Foundation is using these trees now to see the yield of nuts possible.

#### 61. DWARF HYBRID CHESTNUT TREES

S. Anagnostakis *Assisted by* P. Sletten

These hybrid trees were planted by Richard Jaynes from 1970 to 1973. One of the parents in the hybrids was the dwarf species *Castanea seguinii*, and the selected trees that remain produce abundant nut crops and have remained small. These are important parents in our selections of orchard-type trees for Connecticut. The cultivar Little Giant was released to the nursery industry in 1999.

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

K. Stoner and W. Elmer *Assisted by* E. Amezzane, T. Zarrillo, E. O'Dowd, L. Bouffard, C. Zarrella

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. The insects were sampled using pitfall, sweep, and vacuum methods and sorted in the laboratory. The bacteria are isolated from the root zone of the cover crops and the following summer crops (corn in 2001, squash in 2002).

#### 63. 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 plantings. 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.

#### 64. 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 plot 16) 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.

#### 65. 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 variety/rootstock combinations of Japanese plum and four varieties of pawpaws. In addition, three growers in Cheshire, Sharon, and Southington are growing the same varieties.

*Tents were set up and other physical arrangements were made by A. Gagliardi, R. Russell, and C. Whitehead under the supervision of B. Nicholson.*