THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

Record of the Year

2006-2007

The Connecticut Agricultural Experiment Station, founded in 1875, was the first agricultural experiment station in the United States. The Station has laboratories, offices, and greenhouses at 123 Huntington Street, New Haven 06511, Lockwood Farm for experiments on Evergreen Avenue in Hamden 06518, and the Valley Laboratory and farm on Cook Hill Road, Windsor 06095. Station Research is conducted by members of the following departments: Analytical Chemistry, Biochemistry and Genetics, Entomology, Forestry and Horticulture, Plant Pathology and Ecology, and Soil and Water. The Station is chartered by the Connecticut General Statutes to experiment with plants and their pests, insects, soil and water and to perform analyses.

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INTRODUCTION

During the past year, good progress has been made in research and outreach programs. Thousands of state residents received information on trees, crops, medically important arthropods, insect and plant pathogen pests, invasive plants, and soil analyses. New food safety problems were addressed by members of the Department of Analytical Chemistry. Hundreds of food samples were tested for unwanted chemicals in routine market basket surveys. Staff members, who work in diagnostic laboratories in the Department of Plant Pathology and Ecology, are officially contributing to the National Plant Diagnostic Network. Molecular testing of plant tissues for the DNA of the organism that causes Ramorum blight (Sudden Oak Death) is being relied on to detect the plant pathogen. Forests are surveyed for emerging pest problems.

Research programs, which have high public interest, are being further developed. Field tests of soybean and rapeseed cultivars continue to be grown for possible biodiesel fuel production in the state. These plants offer added value because they can be used as feedstock, cover crops, fertilizer, or to control plant parasitic nematodes. New research has been started on determining the cause of saltmarsh grass dieback. Moreover, more than 197,000 mosquitoes were analyzed for West Nile and other encephalitis viruses during this reporting period. Dozens of grape cultivars, personal-sized watermelons, jilo, plums, heirloom tomatoes, cauliflower, and calabaza squash are being evaluated at experimenal farms. There are ongoing studies on tick control.

Scientists and other staff members have been very active conveying new information to stakeholders. Numerous scientific publications report on new findings. Articles have been written for the public. Hundreds of talks and interviews were given to civic groups and reporters to disseminate new technological information. The Station's popular website received more than 1.5 million page views.

This Record of the Year reports on a wide range of research topics of interest to a broad base of stakeholders and clearly demonstrates the dedication of the staff. The report also shows extensive connections with civic groups.

Louis A. Magnarelli
Director

BOARD OF CONTROL

The management of The Station is vested in a Board of Control as specified in Section 22-79 of the General Statutes of Connecticut.

The members of the Board of Control as of June 30, 2007 were

Governor M. Jodi Rell, President
Terry Jones, Vice President
Leon Zapadka, Secretary
Louis A. Magnarelli, Director
Commissioner F. Philip Prelli
Dr. Stephen L. Dellaporta
Norma O'Leary
Dr. Johan C. Varekamp

The Board of Control met on August 2, 2006, October 18, 2006, January 16, 2007, and April 12, 2007.

MISSION STATEMENT

The mission of The Connecticut Agricultural Experiment Station is to develop, advance, and disseminate scientific knowledge, improve agricultural productivity and environmental quality, protect plants, and enhance human health and well-being through research for the benefit of Connecticut residents and the nation. Seeking solutions across a variety of disciplines for the benefit of urban, suburban, and rural communities, Station scientists remain committed to "Putting Science to Work for Society", a motto as relevant today as it was at our founding in 1875.

STATION STAFF

The experiment station exists to advance the frontiers of knowledge for mankind, and that advance depends completely upon the quality of its staff. The following was the staff of The Connecticut Agricultural Experiment Station as of June 30, 2007.

ADMINISTRATION

Dr. Louis A. Magnarelli, Director
Dr. Kirby C. Stafford, III, Vice Director
Michael Last, Chief of Services
Dianne Albertini
Vickie Bomba-Lewandoski
Joan Bravo
Tess Foley
Joan Ives-Parisi
Lisa Kaczenski
Roberta Milano-Ottenbreit
Kathryn Soleski

ANALYTICAL CHEMISTRY

Dr. MaryJane Incorvia Mattina, Department Head
Terri Arsenault
Dr. Brian D. Eitzer
Dr. Lester Hankin, Emeritus
William Iannucci-Berger
Dr. Walter J. Krol
Craig L. Musante
Mamie O. Pyles
John Ranciato
Dr. Christina S. Robb
Dr. David E. Stilwell

BIOCHEMISTRY & GENETICS

Dr. Neil A. McHale, Department Head
Carol R. Clark
Dr. Douglas W. Dingman
Regan Huntley
Cynthia Musante
Dr. Richard B. Peterson
Dr. Neil P. Schultes
Dr. Israel Zelitch, Emeritus

BUILDINGS AND MAINTENANCE

Bancroft Nicholson, Supervisor
Kareem Dixon
Alfred Gagliardi
Gloria Mach
Ralph Russell
Michael Scott

ENTOMOLOGY
Dr. Kirby C. Stafford, III, Department Head
Elizabeth E. Alves
Dr. John F. Anderson, Distinguished Scientist
Dr. Anuja Bharadwaj
Tia Blevins
Rosemarie J. Bonito
Dr. Carole Cheah
Alyson A. Florek
Terrill D. Goodman
Bonnie L. Hamid
Ira J. Kettle
Morgan F. Lowry
Dr. Chris T. Maier
Michael J. Misencik
Tanya Petruff
Angela B. Penna
Gale E. Ridge
Dr. Claire E. Rutledge
Stephen J. Sandrey
Dr. Victoria L. Smith
Dr. Kimberly A. Stoner
Heidi Stuber
Peter W. Trenchard
Michael P. Vasil
Tracy Zarillo

FORESTRY & HORTICULTURE
Dr. Jeffrey S. Ward, Department Head
Joseph P. Barsky
Dr. Martin P. N. Gent
Dr. Abigail A. Maynard
Dr. William R. Nail
Michael R. Short
Dr. Paul E. Waggoner, Distinguished Scientist
Scott C. Williams

LOCKWOOD FARM
Richard M. Cecarelli, Farm Manager
Rollin J. Hannan, Jr.
Michael McHill

PLANT PATHOLOGY & ECOLOGY
Dr. Sharon Douglas, Department Head
Dr. Sandra L. Anagnostakis
Dr. Donald E. Aylor, Emeritus
Mary K. Boucher
Sandra E. Carney
Jason Corwin

Dr. Wade H. Elmer
Dr. Francis J. Ferrandino
Dr. Robert E. Marra
Pamela Sletten
Peter W. Thiel

SOIL & WATER

Dr. Theodore G. Andreadis, Department Head
Dr. Phillip M. Armstrong
Gregory J. Bugbee
Kirsten Deeds
Shannon L. Finan
Dr. Shaoming Huang
Dr. Michelle D. Marko
Dr. Goudarz Molaei
Dr. Joseph J. Pignatello
Roslyn S. Selsky
John J. Shepard
Michael C. Thomas
Dr. Charles R. Vossbrinck
Dr. Jason C. White

VALLEY LABORATORY

Dr. James A. LaMondia, Department Head
Jane Canepa-Morrison
Dr. Richard Cowles
Jeffrey M. Fengler
Rose T. Hiskes
Dr. Dewei Li
Dr. Todd L. Mervosh
James Preste
Thomas M. Rathier
John Winiarski

PLANT SCIENCE DAY

Near record heat and full sun were on hand for the 625 people who attended Plant Science Day, August 2, 2006. With heat at record levels of almost 100^{o} F, the open house was ended at approximately 2:00PM as the crowd dwindled.

The following short talks and demonstrations were fairly well attended despite the smaller crowd.

Richard S. Cowles	Monitoring and Managing Insects in Lawns
Victoria L. Smith	Recent Gypsy Moth Outbreaks in Connecticut
Kimberly A. Stoner	Organic Farming in Connecticut
Todd L. Mervosh	Managing the Toughest Lawn Weeds
Abigail A. Maynard	Mini Watermelons and Japanese Plums: Bigger is Not Always Better
Philip M. Armstrong	Diversity of Mosquito-Borne Viruses in Connecticut

The Barn Exhibits displayed were:

New Techniques for Analyzing Food for Toxins	Brian D. Eitzer, David E. Stilwell, Walter J. Krol, MaryJane Incorvia Mattina, Christina S. Robb, Terri Arsenault, Craig L. Musante, William A. Iannucci-Berger
Wine Grape Cultivar and Clone Evaluation	William R. Nail, Cynthia Maxwell
Identification of Invasive Aquatic Plants in Connecticut Using DNA Technology	Charles R. Vossbrinck
Alien Insects Damaging Woody Plants in the Northeast	Chris T. Maier, Tracy Zarrillo, Morgan Lowry, Shalyn M. Zappulla, Julia S. Daigler, Stephen J. Struble, and Matthew R. Wohlstron
How Earthworm Activity Enhances Plant Health	Wade H. Elmer, Joan Bravo and Alen Chery
Patterns in the Environmental Distribution of Milky Spore Disease Bacteria	Douglas W. Dingman, Cynthia Musante

The Question and Answer Tent was staffed by Sharon Douglas, Thomas Rathier, Gale Ridge, Mary Inman, Rose Hiskes, and John Winiarski

Field plots were planted and maintained by Station scientists with the help of Farm Manager Richard Cecarelli and his assistants Rollin Hannan and Heidi Mizak. The farm crew prepared Lockwood Farm for the hundreds of visitors that came to Plant Science Day. Visitors made their way to the following field plots:

CHINESE CHESTNUT TREES. Sandra Anagnostakis, assisted by Pamela Sletten

SHEET COMPOSTING WITH OAK AND MAPLE LEAVES. Abigail Maynard and David Hill, assisted by C. Maxwell

ANNUAL CULTURE OF GLOBE ARTICHOKES. Abigail Maynard and David Hill, assisted by C. Maxwell

JILO TRIALS. Abigail Maynard and David Hill, assisted by C. Maxwell

PERSONAL-SIZED WATERMELON VARIETY TRIALS. Abigail Maynard and David Hill, assisted by C. Maxwell

CALABAZA SQUASH. Abigail Maynard and David Hill, assisted by C. Maxwell

CAULIFLOWER TRIALS. Abigail Maynard and David Hill, assisted by C. Maxwell

USE OF EARTHWORMS TO SUPPRESS FUSARIUM CROWN ROT OF ASPARAGUS. Wade Elmer, assisted by Joan Bravo and A. Chery

COMPOSITION OF LETTUCE AND TOMATOES GROWN IN HYDROPONICS WITH RECYCLED NUTRIENT SOLUTION. Martin P. N. Gent, assisted by Michael Short

BIOLOGICAL CONTROL OF HEMLOCK WOOLY ADELGID. Carole Cheah, assisted by James Preste

HAS THE SWEDE MIDGE REACHED CT? SURVEYING FOR A NEW PEST. Kimberly Stoner, assisted by A. Scheinkman

WINE GRAPE CULTIVAR AND CLONE EVALUATION. William Nail, assisted by C. Maxwell

THE CATCH BASIN AND WEST NILE VIRUS. John Anderson and Andy Main, assisted by Bonnie Hamid, Terry Goodman, Michael Vasil, Tanya Petruff, Angela Penna, Alyson Florek, Michael Misencik, and Elizabeth Alves

COMPOSTING LEAVES USING THE STATIC PILE METHOD. Abigail Maynard and David Hill, assisted by C. Maxwell

COMMERCIAL CHESTNUT CULTIVARS. Sandra Anagnostakis, assisted by Pamela Sletten and R. Rawle

CONTROL OF BLIGHT ON AMERICAN CHESTNUTS. Sandra Anagnostakis, assisted by Pamela Sletten

NEW HYBRID CHESTNUT ORCHARD. Sandra Anagnostakis, assisted by Pamela Sletten and R. Rawle

USE OF EARTHWORMS TO SUPPRESS VERTICILLIUM WILT OF EGGPLANTS. Wade Elmer and Francis Ferrandino, assisted by Joan Bravo and A. Chery

QUESTION AND ANSWER TENT. Sharon Douglas, Thomas Rathier, Gale Ridge, Mary Inman, Rose Hiskes, and John Winiarski

CAES WEATHER STATION.

ALIEN INSECTS IN CT. Chris T. Maier, assisted by J. Feldhouse, Morgan Lowry, J. MacDonald, and Tracy Zarrillo

THE CT NATIONAL GUARD, 14TH CIVIL SUPPORT TEAM (WEAPONS OF MASS DESTRUCTION). Visiting exhibit

THE CT DEPARTMENT OF ENVIRONMENTAL PROTECTION'S HAZARDOUS MATERIALS TESTING MOBILE ANALYTICAL LABORATORY. Visiting exhibit

ADDITION OF FERTILIZER STIMULATES THE BREAKDOWN OF HIGHLY-PERSISTENT HAZARDOUS CHEMICALS BY NATIVE SOIL BACTERIA. Joseph Pignatello and J. Li

NUT ORCHARD. Sandra Anagnostakis, assisted by Pamela Sletten

DISPERSAL OF CORN POLLEN IN THE ATMOSPHERE. Donald Aylor and M. Boehm, assisted by Peter Thiel and A. Chery

PHYTOREMEDIATION OF AGRICULTURAL SOILS CONTAMINATED WITH DDE. Jason C. White, assisted by A. Bridgewater

EXPERIMENT STATION ASSOCIATES

THE FARMER'S COW. Visiting supplier of milk used for refreshments for the day

MOSQUITO TRAPPING AND TESTING FOR WEST NILE VIRUS. Theodore Andreadis and Phil Armstrong, assisted by John Shepard, Michael Thomas, S. Finan, T. Cloherty, S. DeGennaro, O. DeMasi, D. Krause, L. Meany-Post, E. McClure, R. O'Neil, M.Nelson, C. Pioli, G. Piscitelli, and M. Torretta

HEIRLOOM TOMATO TRIALS. Abigail Maynard and David Hill, assisted by C. Maxwell

CT WEEDS AND WILD PLANTS. Todd Mervosh, assisted by K. Olszewski and D. Reiss

PLANT HEALTH CARE FOR THE CT NURSERY AND LANDSCAPING INDUSTRIES. Timothy Abbey

OILSEED CROPS FOR BIODIESEL. James LaMondia, assisted by Jane Canepa-Morrison and K. Bradshaw

SEROLOGIC EVIDENCE OF TULAREMIA IN CATS. Louis A. Magnarelli, S. Levy (Durham Veterinary Hospital), and R. Koski (L^2 Diagnostics), assisted by Tia Mastrone

THE "DEER" TICK *IXODES SCAPULARIS*. Kirby Stafford, assisted by Anuja Bharadwaj, Heidi Stuber, J. P. Barsky, G. Dunford, L. Colligan, B. Ross, and F. Sansevero

USE OF A RODENT BAITBOX FOR THE CONTROL OF THE "DEER" TICK. Kirby Stafford, assisted by Anuja Bharadwaj, Heidi Stuber, J. P. Basky, G.Dunford, L. Colligan, B. Ross, and F. Sansevero

FIELD TRIALS OF THE FUNGUS METARHIZIUM ANISOPLIAE FOR TICK CONTROL. Anuja Bharadwaj and Kirby Stafford, assisted by Heidi Stuber

INVASIVE AQUATIC PLANT PROGRAM PROTECTING CT. Gregory Bugbee, Robert Capers, Kirsten Deeds, Michelle Marko, Roslyn Selsky, Charles Vossbrinck, and Jason White, assisted by F. Beecher, A. Bridgewater, D. Bridgewater, and E. Pysh

OVERABUNDANT WHITE-TAILED DEER AS SEED DISPERSAL AGENTS. Scott Williams, assisted by Geoff Picard.

MONITORING THE RACES OF POWDERY MILDEW ON MUSKMELON. Francis Ferrandino.

USING LEAF COMPOST IN HOME GARDENS. Abigail Maynard and David Hill, assisted by C. Maxwell.

THE NORTHEAST ORGANIC FARMING ASSOCIATION OF CT. Visiting exhibit

CT FARMLAND TRUST. Visiting exhibit

USDA, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, PLANT PROTECTION AND QUARANTINE. Visiting exhibit

CT INVASIVE PLANT WORKING GROUP. Visiting exhibit
USDA FARM SERVICE AGENCY. Visiting exhibit
CT DEPARTMENT OF AGRICULTURE – MARKETING BUREAU. Visiting exhibit
SOUTHWEST CONSERVATION DISTRICT. Visiting exhibit
BARTLETT ARBORETUM AND GARDENS. Visiting exhibit
CT TREE PROTECTIVE ASSOCIATION. Visiting exhibit
THE CT DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF FORESTRY. Visiting exhibit
USDA FOREST SERVICE, NORTHEAST RESEARCH STATION. Visiting exhibit
OLIN, YALE-BAYER, NEW HAVEN PUBLIC SCHOOL SCIENCE FAIR PROGRAM/CPEP. Visiting Exhibit
CT NURSERY AND LANDSCAPE ASSOCIATION. Visiting exhibit
CT GREENHOUSE GROWERS ASSOCIATION. Visiting exhibit
CT GROUNDSKEEPERS ASSOCIATION. Visiting exhibit
GIRL SCOUT EXHIBIT. Visiting exhibit
NATIVE WOODY SHRUBS. Jeffrey Ward
BIRD AND BUTTERFLY GARDEN. Jane Canepa-Morrison and Rose Bonito, created by landscape designer Anne Bell, L. Starr, and B. Payton, assisted by Richard Cecarelli and maintained by the Spring Glen Garden Club
CT NURSERYMEN'S GARDEN
SURVEYS, NURSERY AND BEE INSPECTIONS. Victoria Smith, Jeff Fengler, Ira Kettle, Steve Sandrey, and Peter Trenchard
CHESTNUT SPECIES AND HYBRIDS. Sandra Anagnostakis, assisted by Pamela Sletten and R. Rawle
DENSE PLANTING OF AMERICAN CHESTNUTS. Sandra Anagnostakis, assisted by Pamela Sletten
DWARF HYRID CHESTNUT TREES. Sandra Anagnostakis, assisted by Pamela Sletten and R. Rawle
THE SPREAD OF SEPTORIA LEAF SPOT ON TOMATO. Francis Ferrandino
DISPERSAL OF SPORES IN A SOYBEAN CROP. Francis Ferrandino
USE OF EARTHWORM TO SUPPRESS FUSARIUM WILT OF TOMATO. Wade Elmer and Francis Ferrandino, assisted by Joan Bravo and A. Chery
INDUCING FUSARIUM DISEASE RESISTANCE IN GLADIOLUS. Wade Elmer, assisted by Joan Bravo and A. Chery
SOUND SCHOOL AGRICULTURAL SCIENCE PROGRAM. Students from the Sound School
ROCKY HILL AMERICAN CHESTNUT TREES. Sandra Anagnostakis, assisted by Pamela Sletten
PINOT GRIS CULTURAL TRIALS: WINE GRAPE CULTIVAR AND CLONE EVALUATION. William Nail, assisted by C. Maxwell
BEACH PLUM TRIALS. Abigail Maynard and David Hill, assisted by C. Maxwell
PAWPAW AND JAPANESE PLUM VARIETY TRIALS. Abigail Maynard and David Hill, assisted by Cynthia Maxwell
WHITE BIRCH RESEARCH ORCHARD. Claire Rutledge, assisted by C. Hayes and S. Hicks

Tents were set up and other physical arrangements were done by Kareem Dixon, Ralph Russell, Michael Scott and Bancroft Nicholson, Supervisor of the Maintenance Crew. Richard Cecarelli and Rollin Hannan of the Farm Crew helped by getting the farm in pristine shape and also helping with the set up. Students of the Sound School Agricultural Program helped also.

At 11:00 AM Dr. Louis A. Magnarelli, Director, greeted visitors and staff. He then introduced Gary Crump, owner, vintner, and manager of Priam Vineyards who was the Samuel W. Johnson Lecturer for Plant Science Day 2006. He spoke on Grapes and Wine in Connecticut. After speaking, Dr. Magnarelli presented him with a certificate signed by Governor M. Jodi Rell, President of the Board of Control, Leon Zapdka, Secretary of the Board of Control, and himself as Director.

The Century Farm Award for 2006 was given to Mulnite Farms of Broad Brook, Connecticut. The Connecticut Agricultural Information Council made the presentation. Mulnite Farms, located at 28 Miller Road, Broad Brook, Connecticut, began in 1905. It is currently operated by cousins Leonard Mulnite and Tom Crockett. Broadleaf tobacco, the first crop, is still grown today along with shade tobacco on the 350-acre farm. Like most farms in New England, changes had to be made in farming operations. During the early years, honey bees were raised to produce hundreds of pounds of honey. There were more than 3,500 chickens raised on the farm during the Great Depression. Potatoes became another important crop, which was rotated with broadleaf tobacco. In 1957, shade tobacco was grown as another new crop. By the mid-1950's, 250 beef cattle, along with tobacco and potatoes, were grown on the farm. A nursery for trees and shrubs, located on 250 acres, was also started during this period. The nursery continued through 1998. Today, tobacco is the main crop, an important export. Although modern farming techniques have replaced the old hand-planting methods of 1905, the emphasis still remains on producing a quality crop.

Following the presentation of the Century Farm Award, Edmund Tucker, President of the Experiment Station Associates, addressed the crowd and invited people to join the Associates.

Plant Science Day 2006 was a very successful day. From the preparation of Lockwood Farm by the farm crew, the setting up of tents and equipment by the farm and maintenance crews, and the manning of exhibits and field plots, information tables, and refreshment stands by professional, technical and clerical staff, all did their part to make the day enjoyable and educational for all who attended.

EVENTS HELD AT THE STATION

SPRING 2007 – OPEN HOUSE

On April 19, 2007 The Station presented "Biofuels for Connecticut" as its annual spring Open House. Vickie Bomba-Lewandoski was the coordinator and moderator, and welcomed guests to the Station and introduced the talks. Dr. Louis A. Magnarelli, Director, gave an update on current research at the Station. Dr. MaryJane Incorvia Mattina gave the talk "Biofuels and Connecticut: Contributions from CAES; Dr. James LaMondia spoke on "Production of Oilseed Crops for Biodiesel and Integrated Pest Management; and Dr. Walter Krol gave the talk "Biodiesel Fuel from Connecticut Oilseed". He also set up an exhibit on "Pressing of Oil-seed Crops". There were also displays on "Biofuels Industries in Connecticut" and "Current Status of Biofuels Activities at UCONN. Tours of the Department of Analytical Chemistry, the BSL-3 Laboratory, an overview of the Invasive Aquatic Weeds Program, and a display on research being done on Salt Marsh Dieback were conducted. Guests were able to get questions answered at a question/answer table, and were able to bring in soil for testing and insects and plants to be identified, and were able to pick up recent Station publications.

INVASIVE AQUATIC PLANT IDENTIFICATION AND MANAGEMENT WORKSHOP

On June 23, 2007 a training workshop was held for volunteer lake monitors, watershed groups, lake associations, boat launch inspectors, scientists and others concerned about aquatic weeds. Fifteen people attended. Attendees learned how to identify invasive aquatic plants and also were given information about managing them in lakes and ponds. Roslyn Selsky arranged the workshop and provided plant ID instruction. Greg Bugbee spoke on controlling nuisance vegetation and Dr. Michelle Marko spoke on biocontrol of Eurasian Milfoil.

EVENTS HELD AT LOCKWOOD FARM

EASTERN BLUEBIRDS AT LOCKWOOD FARM – SUMMER 2006

In the Spring of 2006 five pairs of bluebirds took up residence in boxes set up for them on Lockwood Farm. Setting up the boxes to help increase the population of bluebirds in the area is a project of Lisa Kaczenski. A total of 21 fledglings were successfully hatched by the end of summer.

EVENTS HELD AT THE VALLEY LABORATORY

NURSERY AND LANDSCAPE RESEARCH TOUR

On September 19, 2006 more than sixty nursery and landscape professionals attended the Valley Laboratory's annual Nursery and Landscape Research Tour. They were

welcomed by Dr. James LaMondia. They then toured research plots for the following presentations: New chestnut hybrids, Dr. Sandra Anagnostakis; Rotation of crops for nematode management, Dr. James LaMondia; Conifer nutrition needs, Tom Rathier; Deer management strategies, Scott Williams; Postemergent weed suppression, Dr. John Ahrens; Managing horsetail in landscapes, Dr. Todd Mervosh; Managing hemlock woolly adelgid, Dr. Richard Cowles; Connecticut weed display, Dr. Todd Mervosh, Exotic pest display, Dr. Victoria Smith; Weed management in container grown plants, Dr. Todd Mervosh and Dr. John Ahrens; Mite management in container grown junipers, Dr. Richard Cowles; CAES/CNLA education garden, Tom Rathier and Richard Horvath. After the tours, participants heard the following talks: Biological management of hemlock woolly adelgid, Dr. Carole Cheah; Container physical characteristics, Tom Rathier, Arthropods and pesticides update, Tim Abbey; Disease and cultural problem update, Dr. Sharon Douglas. James Preset, Matt Deltendre, Jane Morrison, John Winiarski, and Richard Horvath provided help with preparations and during the meeting.

ANNUAL TWILIGHT MEETING FOR CHRISTMAS TREE GROWERS

On July 11, 2006, over 70 growers and professionals attended the annual Christmas Tree Twilight Meeting, at the Valley Laboratory, sponsored by the Experiment Station and the Connecticut Christmas Tree Growers Association. Attendees toured the Christmas tree plots and heard the following presentations: Fertility and cultural management, Tom Rathier; Disease management, Dr. Sharon Douglas; Cover management, Dr. John Ahrens; Insect and mite management, Dr. Richard Cowles; Weed management, Dr. Todd Mervosh; Connecticut weed display, Dr. Todd Mervosh, Krystle Olszewski and Dorothy Reiss. Richard Horvath, James Preste, Matt Deltendre, and Nick Sikorski provided support for the meeting.

ANNUAL TOBACCO RESEARCH MEETING

About one hundred and forty five people attended the Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the Suffield High School auditorium on February 21, 2007. Drs. Jim LaMondia and Lou Magnarelli, Director of the Station, welcomed growers. The meeting addressed many topics of concern to growers. Dr. Magnarelli gave growers an overview of research and services at the Experiment Station, James LaMondia spoke about research on management of tobacco pathogens including blue mold and tobacco mosaic virus and results of the breeding program for multiple pathogen resistance. Thomas Rathier spoke about nutrient management under plasticulture, black root rot and diagnostic problems in 2006. Dr. Todd Mervosh spoke about herbicide effects on tobacco. Mr. Jeremy Forrett spoke about updates and changes in the insurance program and Ross Eddy of the Farm Services Administration provided updates on their services to growers. Robin Helrich and Travis Averill of the New England Agricultural Statistics Service provided updates on their services to growers. Jane Canepa-Morrison and Jim Preste assisted with much of the behind the scenes work for the meeting. The meeting qualified for pesticide applicator re-certification credit in both Connecticut and Massachusetts. Posters on 'Disease

management using plant genetic resistance' and 'Seed production to maintain resistance and cultivar identity' were presented.

STATION PARTICIPATION AROUND THE STATE

CAES DISPLAY AT THE BIG E
WEST SPRINGFIELD, MA

On September 27-28, The Station hosted a display in the Connecticut Building at The Big E. Two posters on biodiesel entitled "Oilseed Crops for biodiesel and conversion of Oilseed to Biodiesel" were displayed. The posters represent a cooperative project by Dr. Walter Krol and Dr. James LaMondia. Live honey bees were also displayed. Golden Smoothie apple slices, and a demonstration on sunflower seed pressing were enjoyed by visitors. More than 40,000 people visited the building per day. Staff who assisted with the booth were Ira Kettle, Rose Bonito, Lisa Kaczenski, Rose Hiskes, Dr. Walter Krol, Tia Mastrone, Vickie Bomba-Lewandoski, Heidi Stuber, and Dr. James LaMondia.

CAES DISPLAY AT THE CONNECTICUT FLOWER AND GARDEN SHOW

From February 22-25, the Station had displays at the Connecticut Flower and Garden Show held at the Connecticut Convention Center in Hartford. Ira Kettle, Rose Bonito, Lisa Kaczenski, Peter Trenchard, Todd Mervosh, and Steve Sandrey manned the display and interacted with the public.

FULL SCALE INCIDENT COMMAND SYSTEM EXERCISE

From March 6-8 the Station, the USDA Plant Protection and Quarantine Division, and Forestry Division of the Connecticut DEP held a full-scale exercise of the Incident Command System for a plant pest at the Sessions Woods WMA in Burlington, CT. The Emerald Ash Borer was selected as the pest detected in a state forest campground for the purpose of the exercise. There were at least 50 participants in the exercise including the evaluators and controllers and state foresters. Dr. Kirby Stafford, State Entomologist, Ms. Patty Douglas, USDA/PPQ State Plant Health Director, and Mr. Don Smith, State Forester, served as the unified command. Participants from the Station were: Dr. Victoria Smith, Dr. Jeffrey Ward, Mr. Joseph Barsky, Dr. Claire Rutledge, Mr. Peter Trenchard, Mr. Steve Sandrey, Mr. Scott Williams, Mr. Jeffrey Fengler, and Ms. Tia Mastrone. The exercise provided valuable training for dealing with a real plant pest incident.

2007 CPTV FAMILY SCIENCE EXPO

The Experiment Station hosted a booth and exhibit at the CPTV Family Science Expo in Hartford from April 26-28, 2007. The Station exhibit included a biodiesel display, numerous oil and seed samples and a live seed pressing demonstration. A honey bee observation hive was also displayed. Station staff that manned the booth were Ira Kettle,

Lisa Kaczenski, Walter Krol, Vickie Bomba-Lewandoski, Tia Mastrone, Rose Hiskes, Douglas Dingman, Rose Bonito, Stephen Sandrey, and James LaMondia. Approximately 13,500 people visited the Expo.

DONATIONS MADE TO THE COMMUNITY

LOCKWOOD FARM

A total of 4,555 pounds of tomatoes, cantaloupes, squash, watermelons, eggplant, pears, apples and other assorted fruits and vegetables grown at Lockwood Farm were donated to St. Vincent de Paul of Waterbury, High Meadows in Hamden, and the CT Food Bank in East Haven,

VALLEY LABORATORY

A total of 3,650 pounds of tomatoes, pumpkins, plums, and cauliflower grown at the Valley Laboratory were donated to Foodshare of Hartford, the Boy Scouts, the Sound School and Northwest Park of Windsor. Drs. Abigail Maynard, David Hill, Todd Mervosh and James LaMondia generated the fresh produce, and Jim Preste and Dr. LaMondia organized the distribution effort. The Valley Laboratory also provided Christmas trees to the Governor's mansion and loaned irrigation equipment to the Connecticut Epilepsy Foundation in support of their Mud Volleyball Tournament Fundraiser. Mr. Preste coordinated the distribution of the irrigation equipment.

AWARDS AND RECOGNITION RECEIVED BY STATION STAFF

Dr. David Stilwell was appointed to a three-year term on the Editorial Review Board of Environmental Toxicology and Chemistry in November 2006

Dr. Sharon Douglas received the 2006 Award of Merit from the Connecticut Pomological Society at their Annual Meeting December 5, 2006

Mr. Greg Bugbee was recognized by the Northeast Aquatic Plant Management Society with a plaque for "Outstanding Contributions" to the Society, for service on the Board of Directors, presentation of papers, and expanding the recertification program in January 2007.

Ms. Tia Blevins received a Certificate of Accreditation for the successful completion of the Connecticut Accredited Nursery Professional Program January 4, 2007

Dr. Sharon Douglas received the Award of Merit from the Connecticut Tree Protective Association for "exemplary professionalism and dedication to the care and protection of Connecticut trees" at their Annual Winter Meeting January 18, 2007.

Dr. Abigail Maynard was appointed by the DEP Commissioner to the Solid Waste Advisory Committee (SWAC) Subcommittee on Organics Recycling and Composting on April 24, 2007.

Dr. Joseph Pignatello was awarded an "Excellence in Review Award" by the editors of Environmental Science & Technology for review of manuscripts for the journal June 26

Dr. Jason White was awarded an "Excellence in Review Award" by the editors of Environmental Science & Technology for review of manuscripts for the journal June 26

LOCKWOOD LECTURE

DR. LAWRENCE E. DATNOFF

On April 13, 2007, Dr. Lawrence E. Datnoff of the Department of Plant Pathology, University of Florida – IFAS, Gainesville, Florida, gave the talk "Benefits of Silicon in the Life, Performance, and Health of Plants". His research focuses on the biology, etiology, epidemiology, and control of both foliar and soilborne diseases of rice and turfgrass, primarily in and around the Everglades Agricultural Area of South Florida. His interests have included understanding the interactions of silicon with fungicides, residual effects of silicon on disease development, the influence of silicon in the enhancement of host plant resistance, and the mechanism(s) of silicon-mediated resistance.

EXPERIMENT STATION ASSOCIATES

ANNUAL MEETING HELD

On March 22, 2007 the Experiment Station Associates held their Annual Meeting in Jones Auditorium. Dr. James LaMondia presented a talk on the farm aspects of biodiesel fuel, and Dr. Walt Krol presented a talk on the chemistry behind biodiesel fuel. Approximately 30 members attended the meeting.

THE PUBLIC SPEAKS

In July, 2006, Sue Quatrella of The Center for 21st Century Skills wrote the following to Dr. Kirby Stafford. "Thank you so much for participating in our week-long seminar this summer at the University of New Haven. We appreciated your discussion on Lyme disease. It was intriguing and informative."

On July 5, 2006 Barbara O'Connor of Planters' Choice Nursery, wrote the following to Dr. Sharon Douglas. "Thank you for your prompt reply to my inquiry on Black Walnut toxicity. I will now be considered the Black Walnut guru of Planters' Choice."

On July 6, 2006, Gerry Frumenti of the ISIS faculty wrote the following to Dr. Louis A. Magnarelli. "On behalf of the ISISX Fellows and Staff at SCSU, I would like to express our deep appreciation and thanks to you and the staff at both the New Haven and Hamden facilities. Your knowledge, insight, and willingness to share your work with our group shows the communal spirit of science. Please express our gratitude to Dr. MaryJane Mattina, Dr. Neil McHale, Dr. Sharon Douglas, Dr. Abigail Maynard, Dr. Sandra Anagnostakis, and Dr. William Nail. Give our special thanks to Ms. Vickie Bomba-Lewandoski for her time and excellent organization of our visit. The knowledge gained by these 20 high school teachers will be multiplied a hundred fold as they educate our students."

On August 16, 2006, Bud Gavitt, Editor of The Real Tree Line, wrote the following to Dr. Kirby Stafford. "Your informative article entitled "The Tick Management Handbook: A Resource for the Prevention of Lyme Disease" appears on pages 14 and 15 in the enclosed August 2006 issue of The Real Tree Line. Thank you very much for writing it. Thanks also for sending me extra copies of the "Pesticide Guide Toward Integrated Pest Management for Christmas Tree Growers, 2006. The CCTGA appreciates the fine work you and others at the Station do for the state's Christmas tree growers. The pesticide guide will be of great use by our grower members."

On August 23, 2006 Diane Gladstone of Killingworth wrote the following to Dr. Louis Magnarelli regarding help received from Greg Bugbee. "I am writing to tell you how much my husband and I appreciated the assistance Greg Bugbee gave us when we called him asking questions about growth in our pond. It is wonderful that residents in CT have a resource such as yours to turn to when confronted with environmental problems that we don't understand. Greg not only spent time with me on the phone, but he came out to our home and spent 2 hours in and around our pond, testing the water and growth to evaluate our best course of action. Because of his advice, we feel confident that we are aware of our options and are reassured that what problems we have with our pond growth are manageable. … Please let the legislature know that ordinary citizens really appreciate the services you provide. You folks have the experience and expertise to guide inexperienced people like me and it is wonderful to know that I can now manage my little pond properly!"

On September 2, 2006 Dennis and Sally Kocyla wrote the following to Dr. Sharon Douglas. We enjoyed your slide presentation on Poisonous Plants. We learned a lot about many poisonous plants from your talk. It was nice meeting you and having you as our speaker. On behalf of the Naugatuck Valley Audubon Society, thank you very much for your interesting talk."

On September 28, 2006 Dr. Victoria L. Smith wrote the following to Dr. Robert Marra. "Thank you for your presentation on *P. ramorum* DNA studies at the recent Forest Cooperators Meeting. The information you presented contributed to the success and enjoyment of this meeting, and highlighted the exemplary research we conduct here."

On October 6, 2006 Dorothy C. Johnson of the Spring Glen Garden Club wrote the following to Dr. Jeffrey Ward. "Thank you so much for making our meeting informative and tasty. The membership really enjoyed our tour. …"

On November 6, 2006 Vincent Lavorgna, Brooksvale Park Ranger, wrote the following to Dr. Kirby Stafford. "I am writing to acknowledge and thank Ira Kettle for his participation at the Brooksvale Fall Festival again this year. This was Ira's third year presenting his beekeeping program under the traditional crafts tent. I first met Ira when my Brooksvale Nature Campers attended Lockwood Farm's Plant Science Day. The campers were drawn to his live display and Ira fielded all of their questions patiently. I could see his passion for his work. When I approached Ira about participating in the Brooksvale Fall Festival, he was receptive and willing to help. Despite some harsh weather conditions, he has continued to attend and contribute his expertise. His exhibit is one of the most popular each year. Thank you for allowing Ira to attend and contribute to the festival."

On November 8, 2006 Heather Robins, Editorial Assistant for The American Gardener, wrote the following to Dr. Sharon Douglas. "Please find enclosed your complimentary copy of the November/December 2006 issue of The American Gardener. Thank you for your contribution to the poisonous plants article, which begins on page 36. We hope you will enjoy the rest of the magazine as well."

In December, Carla Roselli and several other teachers from Lyman Hall High School wrote the following to Vickie Bomba-Lewandoski. "Thank you for taking the time out of your busy day to show us your facility. We enjoyed seeing what research was new and what the scientists were studying. We found it to be very interesting and educational. Please thank all the scientists who spoke to us. Once again, thank you for a delightful day."

On December 6, 2006 Bernard J. Raimo, Forest Health Protection Group Leader, wrote the following to Dr. Victoria Smith. "I would like to congratulate you and your aerial survey staff on getting your data in to us so quickly. The CT aerial survey team had many challenges this year with the significant increase in damage to map as well as implementing new technology … to collect forest health information. Your team did an excellent job meeting these challenges and was able to embrace the technology very

quickly in order to get your aerial survey data in ahead of schedule. Enclosed you will find three awards, one for you, Peter Trenchard, and Tia Mastrone with our appreciation for all your hard work. We look forward to working with you and your staff in the future."

On December 8, 2006 Daryll C. Borst, Professor of Biology at Quinnipiac University, wrote the following to Dr. Robert Marra. "I would like to thank you for taking time to discuss your research on *Phytopthora ramorum* and Ramorum Blight, and the concerns about this pathogen for the Northeast. Your discussion on the history of *Phytopthora ramorum* and the importance of how it has spread to the nursery industry was most appropriate for my students. I am a firm believer that understanding the history of a scientific problem is crucial to its solution. Your discussion of how molecular biological procedures such as ELISA, have become critical tools in the accurate, quick identification of the Ramorum Blight pathogen in quarantined nursery stock in Connecticut, was timely. Because biology today emphasizes molecular research, it has become my mission to expose my students to the world of organisms and how they relate to molecular biology. It is important that students learn that applied, practical research is just as important as pure research. Thank you again for your talk to my botany students."

On December 8, 2006 Dr. Daryll C. Borst, Professor of Biology at Quinnipiac University, wrote the following to Dr. Sharon Douglas. I would like to thank you for taking time this year to speak to my botany students about your work with plant diseases. Unfortunately, a thirteen week semester does not allow me to spend much time on every aspect of botany, and plant pathology is only superficially covered. Your presentation provided my students with an excellent overview of the importance of plant pathology, and how your work specifically provides this valuable service to the citizens of the State of Connecticut. The statistics of the inquiries to your section emphasized this. Your talk about the historical impact of plant pathogens such as late blight of potatoes and coffee rust, underscored to my students how relevant plant science is to their daily lives. Your explanation of the interrelationships of the plant disease "triad", and the steps for disease prevention and control clearly showed the complexities and importance of plant pathology. Your work at the Station always provides my students with new career possibilities that they were not aware of. Thank you again for your talk to my botany students."

On December 10, 2006 Robert Wick, a professor in the Department of Plant, Soil, and Insect Sciences at the University of Massachusetts, wrote the following to Dr. Robert Marra. "Thank you very much for your excellent seminar. We had a mixed crowd but the information was general enough on one end and scientifically noteworthy on the other so there was something there for everybody. When I get back from Bangladesh, we can find time to visit about Phytopthora, and you can meet my new student. Thanks again …"

On December 10, 2006 Holly Hawkins of Spring Glen School wrote the following to Roberta M.-Ottenbreit. "Please give our thanks to Dr. Douglas and Dr. Peterson for taking the time to meet with the 6th graders from Spring Glen School. We may have

sparked an interest in plant science or chemistry. Field trips add another dimension to the kids' education. Thanks again."

On January 7, 2007 Robert V. Heffernan, Executive Director of the Connecticut Nursery and Landscape Association and the Connecticut Greenhouse Growers Association, wrote the following to Dr. Victoria Smith. "All of us at CGGA and CNLA are so grateful for your professional, personal effort and time in speaking at our Winter Symposium. We heard many compliments about your presentation, and the evaluations that came in were all positive about your performance. The success of a conference of this type depends entirely on its speakers. And, this was one of the most successful Winter meetings we've ever held. We salute you for all the energy and effort you put into making your talk so informative. It says volumes about your good personal character that you would want to share your personal knowledge to help improve the businesses of your fellow green industry colleagues. The Officers and Boards of Directors join me in sending our warmest appreciation to you. Thank you!"

On January 8, 2007 Ellen Sloan of the CT Department of Consumer Protection wrote the following to Dr. Louis Magnarelli. "I would like to extend my sincere appreciation to the Analytical Chemistry Department for their commitment to quality and services. Dr. MaryJane Incorvia Mattina and her staff have always been extremely responsive and helpful, and recently provided exceptional service on samples obtained as part of the pesticide residues analysis program. Work schedules were rearranged and analyses were expedited as the unusual situation of multiple violative residues on imported produce developed and was confirmed. Prior to this latest event, various previously obtained violative samples were also handled in a very professional and efficient manner. Dr. Mattina, Dr. Eitzer, Dr. Krol, and Terri Arsenault all kept in close contact with the Food & Standards Division and me during this time, maintaining a smooth sharing of information. In addition, lab documentation data was provided to this office and subsequently forwarded to the US Food & Drug Administration via e-mail, assuring prompt and clear transmission of vital information from agency to agency. The CAES should be very proud to have such dedicated and capable staff to provide services to the residents and regulatory agencies of Connecticut."

On January 8, 2007 David Kuack, *Editor of* GM*PRO*, wrote the following to Dr. Sharon Douglas. "Enclosed is a copy of the January issue of GM*PRO* that contains the article you prepared on "Healthy roots lead to healthy plants" (see page 90). Thanks again for preparing the article and for providing photos to illustrate it. Also, thanks for taking the time to proof the edited version of the article prior to publication. …"

On January 10, 2007 Kathy Kobiskyn wrote the following to Dr. Sharon Douglas. "Our club enjoyed your presentation yesterday on Diseases of the Perennial Garden. Thank you so much for your time and talent. Enclosed is a small token for you with grateful appreciation. …"

On January 11, 2007 Christian B. Dellis, Phytosanitary Issues Management Office, USDA, wrote the following to Dr. Victoria Smith and other participants in the PCIT

Program. "… Thanks again for your participation and your efforts in making PCIT a success. Your feedback led to over 100 changes to PCIT and has made PCIT more robust across the nation. Future development is underway and new versions will be forthcoming in 2007. We look forward to increased PCIT usage and a successful New Year."

On January 15, 2007 Peter Hlousek of the Bonsai Society of Greater New Haven wrote the following to Dr. Claire Rutledge. "On behalf of the Bonsai Society of Greater New Haven I want to thank you for a great presentation last week. Honestly, I wasn't sure how your topic would be received by our members. I am happy to say they loved it! They had lots of questions and you had the answers. Your slides and discussion topics were on target. Not only did you educate us, you made us want to hear more. Everyone in attendance asked to have you back again in the future. If you are up for it, you will be asked. Thanks again."

On January 26, 2007 Tom Morris, Regional Coordinator, Northeast SARE, wrote the following to Dr. Victoria Smith. "I thank you for taking the time to attend our NE SARE PDP meeting on January 23-24. I am sure it wasn't easy for you to take time out of your schedule to participate in the meeting. We greatly appreciate your feedback during the meeting and your commitment to learning more about our state programs. It will be valuable for the Administrative Council to have your input at the AC meeting next month to help them understand the rationale for the state coordinators' request for increased funding. Thanks again for your willingness to help with the process of developing a proposal for restructuring state programs."

On January 30, 2007 Michael D. Johnson, President of Summer Hill Nursery, Inc., wrote the following to Dr. Louis A. Magnarelli. "At my request, Richard Cowles came by Summer Hill today to discuss our insect problems, telling us of new materials and methods to solve them. I don't have to tell you about Richard's enthusiasm and his vast knowledge of the subject. I do want to say that the five members of our staff responsible for the actual spraying certainly appreciated his input. One thing that struck me very strongly was the comments our people made about the advice he has given us in the past and the good results we have had from the treatments he suggested. Our propagator, who was in today's discussion group, just walked in and mentioned that he learned more in the two hours this morning than in any number of other people's talks he has attended over the years. I want to let you know how much we appreciate the time Richard gave us, as well as the help other members of your staff have given us. I've said this before, but I can't repeat it enough – I don't know how we could stay in business without the support of the Experiment Station. Thank you!!!"

On February 5, 2007 Paul Moore, Quarantine Officer, USDA Forest Service, e-mailed the following to Dr. Victoria Smith and Eric A. Chamberlain of APHIS, USDA. "I wanted to thank you for coming down to inspect our quarantine. It was good experience for me to interact with both you and Eric and it gave me more insight into what is expected of the quarantine officer. I also learned a few things I didn't realize about the

facility! … Thanks again and I hope you feel free to contact me with any questions or concerns you have."

On February 6, 2007 Jerome Wexler, a nature photographer/writer, wrote the following to Dr. Louis A. Magnarelli. "Today is the 6th of February – the 84th anniversary of my birthday. It's time for me to retire. As a result, I would like to make your department a gift. I would like to donate all of the equipment in my photographic studio to you. My studio is different from most. It is designed for only one purpose – photographing small objects from 1/8th inch in diameter to about 12 inches. The equipment consists of cameras, bellows, lenses, strobe lights, a posing table designed not for people but, as I said, for photographing small objects. With my equipment it is a breeze to photograph an object and have its' image recorded ten times life size. I invite you, or any one of your staff, to visit and see it yourself. With it I've had about four thousand photos published including 51 books. I would like very much for you to give my studio a home. Thank you for your time."

On February 9, 2007 Jeanne Grandy, Program Committee Chair for the West Hartford Garden Club, wrote the following to Dr. Sharon Douglas. "Just a brief note to say again – Thank you! for your very informative presentation to the West Hartford Garden Club on Thursday. The accolades are still coming! We trust that the two books (Native Plants of the Northeast, 2005, and the A.H.S Pruning and Training, 1996) will be very useful additions to your work library. Use them with our heartfelt gratitude!"

On March 1, 2007 Kristie Gonsalves Harrington, President of North East Expos, Inc., wrote the following to Dr. Sharon Douglas. "Thank you for presenting a seminar at the 26th Annual Connecticut Flower & Garden Show that was held at the Connecticut Convention Center this past weekend. We did experience some "growing pains" going to the larger facility. The seminar portion of our show continues to be very popular and we will try to rectify any difficulties the public and the speakers had in locating the rooms, etc. The comments we did receive about the lectures themselves were very positive. Again, thank you for speaking at the Connecticut Flower & Garden Show and bearing with us our first year at the Convention Center. I look forward to the opportunity to work with you again in the future."

On March 3, 2007 Marcella Davidson wrote the following to Dr. Sharon Douglas. "Thanks so much for your most helpful talk about blemished laurel the other day – and also for the good information which you mailed. Have put it in file folder for on-going use. I really appreciate your helpfulness!"

On March 7, 2007 Maryjane Arsenault, Meeting Committee Chair for the Connecticut Tree Protective Association, Inc., wrote the following to Dr. Victoria L. Smith. "On behalf of the Board of Directors of the CTPA, I'd like to thank you for your generous donation of time to share your experience and expertise with our membership at our recent annual meeting. The response from attendees was that they were very pleased with your presentation and the information you imparted. They were interested in the updates you provided on Gypsy Moth outbreaks over the past 2 years, and enjoyed your

presentation style. I would also like to personally thank you for your help in putting the program together and in organizing the speakers from the CAES. The program would not have been as great a success without your efforts. Your participation was greatly appreciated and we hope that it was a successful and enjoyable day for you. I welcome any input or comments you may have regarding the meeting."

On March 7, 2007 Maryjane Arsenault, Meeting Committee Chair for the Connecticut Tree Protective Association, Inc., wrote the following to Dr. Sharon Douglas. "On behalf of the Board of Directors of the CTPA, I'd like to thank you for your generous donation of time to share your experience and expertise with our membership at our recent Annual Meeting. We received overwhelming positive feedback from attendees indicating that your presentations on 'Noteworthy Diseases of 2006' and 'How to "Kill a Tree in 10 Easy Steps' were excellent. They thoroughly enjoyed your presentation style and were very impressed by the material presented. Your participation was greatly appreciated and we hope that it was a successful and enjoyable day for you. I welcome any input or comments you may have regarding the meeting."

On March 22, 2007 Anne Margolis, Managing Editor of *Northern Woodlands* magazine wrote the following to Dr. Jeff Ward. "Thank you for contributing artwork to this issue of *Northern Woodlands*. The illustrations and photographs are a central element of the magazine; readers regularly comment on the artwork found on the cover and within the pages of *Northern Woodlands*. We consider ourselves very lucky to be able to use the work of talented illustrators and photographers like you."

On March 26, 2007 Leanne Pundt, Perennial Plant Conference Program Coordinator at UCONN, wrote the following to Dr. Sharon Douglas. "On behalf of the Ornamental Plant Extension Team at the University of Connecticut, I wish to thank you for your participation in the 2007 Perennial Plant Conference. The conference was a great success, and this success is largely due to the expertise and professionalism of the speakers. Your lecture on *Managing Diseases of Perennials in the Landscape* was especially well received. 91% rated your presentation as good to excellent. … Again, many thanks for sharing your expertise with us and taking the time to do so during your busy speaking season."

On March 26, 2007 Rachel Brigham, a 10th grade student at Battlefield High School, wrote the following to Dr. Sharon Douglas. "I would truly like to thank you for all of the time spent and invested in the report. I also appreciate the constructive comments in which you have left for me. I will take them into consideration and use them, for to my excitement and surprise, I am going to Virginia's State Science and Engineering Fair in two weeks. The research that you have provided me with was also a tremendous help, and I have realized, after reading your remarks, that I did not communicate my results of the process of projection of the fruiting bodies well enough. … I again would like to thank you from the bottom of my heart for your superior and exceptionally helpful input and response, and also would like to ask you for your permission to include your hard copy response in the presentation of the project at the state level? Thank you."

In April, 2007 Sue Jacozzi, John Cimarosa, and Patrice Sulik of the Westport Weston Health District wrote the following to Dr. Kirby C. Stafford. We wanted to take this opportunity to thank you for your significant contribution to our wildlife symposium. Although the attendance was not what we had hoped for, we really appreciated your presentation. In a couple of weeks we hope to have our summary report and the full transcript available on our website @ www.wwhd.org. We look forward to continuing to work with you on future endeavors."

On April 2, 2007 Lise Orville, Mentor Coordinator for the New Haven Science Fair, wrote the following to Dr. Louis A. Magnarelli. "We would like to recognize Dr. Philip Armstrong who was a science fair mentor this year at Hyde Leadership School, a public New Haven high school. He was an excellent and caring mentor who worked with Rob and Anthony from October to March doing research on the effect of salinity on development of *Culex salinarius* mosquitoes. Sometimes the mosquitoes died or the results were unexpected but with Phil's guidance the boys forged ahead and the result was an excellent project. In fact the boys won a second place award at the New Haven Fair and also a Peabody award at the CT Fair, so they were thrilled. I hope that Phil will be willing to mentor again next year. His community involvement was extremely important for these students who had not been academic stars but who became real scientists and gained a lot of confidence. Next year the New Haven Science Fair is going to emphasize the environment; we would love to have more mentors from the CT Agricultural Experiment Station working with our students."

On April 17, 2007 F. Philip Prelli, Commissioner of the CT Department of Agriculture, wrote the following to Dr. MaryJane Mattina. "On behalf of the Department of Agriculture, I would like to thank you and your department for the testing performed on the contaminated chocolate milk from the Old Saybrook school system. Your fast action and thorough testing assisted in quickly identifying the contaminant and led to our Department addressing the recall and solution as well as establishing a long term solution. I was truly impressed with the speed and thoroughness your department used in handling this matter. Again thank you for your assistance."

On April 27, 2007 Jocelyn T. Shaw wrote the following to Dr. Sharon Douglas. "Thank you so very much for your time on the telephone and for sending me the information I need regarding species tolerant of black walnut toxicity. This guidance is invaluable. I only hope that the bank will get dry enough soon so that I can keep my footing on that slope without wiping out what little is still there. I have much to do to improve soil stability on that steep incline that used to be so nicely stabilized with various grasses before it became so shaded. I greatly appreciate our being willing to hear from me again, should I feel the need of further advice. Many thanks."

On May 5, 2007 Chris Donnelly, Secretary-Treasurer of the Connecticut Tree Protective Association, Inc., wrote the following to Dr. Louis A. Magnarelli. "Once again, I would like to acknowledge the great generosity of the Connecticut Agricultural Experiment Station, through its support of trees and tree care in Connecticut and, in particular, the assistance the Station provides to CTPA's Arboriculture 101 program. It is difficult to

imagine this course happening, much less happening so successfully, without all of the Station's many contributions, including the use of the auditorium and the participation of various staff members, including Dr. Jeff Ward, Mr. Tom Rathier, Ms. Rose Hiskes, Dr. Jim LaMondia, and Dr. Claire Rutledge – and Gloria, who is always so patient waiting for us to finish up in the evening. … The relationship between CTPA and the Agricultural Station has always been close, for which all of us in the Association are grateful. … All of us at CTPA look forward to the continuation of our relationship with the Station, and to the many good things certainly still yet to come from the CAES."

On May 11, 2007 Joy Shaw wrote the following to Mary K. Inman. "Thank you so very much for all the excellent information on "Hairy bittercress". I am especially relieved to know that I am probably not the responsible vector for my brother's and my neighbor's properties. I am very glad to have this information to share with the above concerned parties – including the control options."

On May 15, 2007 Mary McKellar, Education and Training Coordinator, Northeast Plant Diagnostic Network, Cornell University, wrote the following to Dr. Victoria Smith. "I would like to thank you for your participation in the NPDN Exercise for *Phytophthora ramorum* in Connecticut, March 29-April 19, 2007. Your participation in the exercise was vital to the success of the activity. The after-action report can be found on the PDIS website (www.pdis.org) and can be accessed through the exercise module at any time with your PDIS username and password. We hope that the experience will help with preparations for regulatory detections in your state. …"

On May 15, 2007 Mary McKellar, Education and Training Coordinator, Northeast Plant Diagnostic Network, Cornell University, wrote the following to Dr. Victoria Smith. I would like to thank you for your participation in the NPDN Exercise for Emerald Ash Borer in Connecticut, February 26-28, 2007. Your participation in the exercise was vital to the success of the activity. The after-action report can be found on the PDIS website (www.pdis.org) and can be accessed through the exercise module at any time with your PDIS username and password. We hope that the experience will help with preparations for regulatory detections in your state."

On May 29, 2007 Sharon Chemacki wrote the following to Dr. Sharon Douglas. "Thank you so much for the information. I appreciate it! I passed on the document to my folks and my dad plans to follow the suggestions."

On June 11, 2007 Judy Crawford, Secretary of the Joseph Lawrence School of Nursing Alumni Association, wrote the following to Dr. Kirby Stafford. "Thank you so much for the most informative program that you presented last week. There has been so much feed back from members about what a "great presentation" it was. So glad that you were able to join us for lunch. Thanks again."

On June 13, 2007 John Adzima wrote the following to Dr. Sharon Douglas. "Thank you for your telephone report regarding the pine tree samples I sent you last week. I very

much appreciate your quick response, removing our concern that we might be faced with an insect or disease problem."

In June, 2007, Michael Darre of the College of Agriculture and Natural Resources at UConn wrote the following to Dr. Kirby Stafford. "I just want to thank you for your participation in the 2007 Poultry Biosecurity and Pest Management Workshop. Your presentation on insects of concern to poultry producers was right on the mark! I know it was not a large crowd, but everyone learned something new and complimented your presentation. My sincere thanks."

In June, 2007, Dennis and Sally Kocyla of the Naugatuck Valley Audubon Society wrote the following to Rose Hiskes. "On behalf of the Naugatuck Valley Audubon Society, thank you for the interesting program you gave on Plants Out of Place. Your talk was very informative and your slides were great. We learned to identify some weeds by looking at your slides and at the live samples. Thank you for getting the live specimens for us to touch and examine. We also enjoyed hearing you talk about edible plants. Everyone learned from your wonderful talk. It was nice having you for a speaker. Thank you very much for coming."

On June 18, 2007 Marnie Ruebert, Treasurer of the Joseph Lawrence School of Nursing Alumni Association, wrote the following to Dr. Kirby Stafford. "The Joseph Lawrence School of Nursing Alumni Association wants to thank you for your wonderful speech on ticks that you gave to us. We truly enjoyed it and appreciate your coming to speak to us. We sure learned a lot! … Many thanks again and hope we see you again."

THE PRESS SPEAKS

The New Haven Register of July 9, 2006 carried the Article "Under Control: Scientists farm beetles to manage spread of purple loosestrife" by Abram Katz. Purple Loosestrife, a plant brought over from Europe in the early 1800's to remind immigrants of their European homes, has outlived its welcome in the U.S. It is now a stubborn, fast spreading, invasive plant that takes over swamps and meadows and crowds out native species. Scientists found beetles, *Galerucella calmariensis* and *Galerucella pusilla* feed on loosestrife and they imported them and released them on plants in Connecticut. Gale Ridge stated that it would be very unlikely for these beetles to change over their diet from eating the invasive plants to food crops or native plants. She stated "The U.S. Department of Agriculture tested the beetles against about 50 plants, including close relatives of purple loosestrife. The small leaf-eaters could not be more finicky. It seems like the scientists are confident that they won't switch diets. It's a calculated risk." It will be several years before the work of the beetles is noticeable and fields of purple loosestrife begin to shrink.

The Record Journal of July 24, 2006 carried the article "A Natural Plan for Boulder Knoll Farm" by Andrew Perlot. Discussion began in July on what to do with Boulder Knoll Farm in Cheshire. The Friends of Boulder Knoll would like to see it as a working organic farm. Dr. Kimberly Stoner is a member of Friends of Boulder Knoll. She stated "The open space that we have in Cheshire, we've preserved over the years for several reasons. One of them is beauty, another is habitat for wildlife. In a case like Boulder Knoll, which is prime agricultural farmland, it is also important to preserve working lands."

The Connecticut Post of August 3, 2006 carried the article "Green get-together: Plant Science Day brings together top scientists and farmers, nursery owners, and anyone else interested in plants" by John Burgeson. A talk by a CT vintner, Gary Crump of Priam Vineyards, information on American Chestnut by Dr. Sandra Anagnostakis, information on efforts to keep highways safe from collisions with deer by Dr. Jeffrey Ward, information from Geoff Picard on determining what deer eat by growing their deer pellets and information on many other research fields were reported on.

The Connecticut Post of August 3, 2006 carried the article "Here's the buzz on how to get bees to collect on your face" by John Burgeson. Ira Kettle was asked how bees could be coaxed to congregate on an actor's face in horror movies. He said it was "Simple". He explained that if you tie a queen bee under your chin, worker bees would congregate on your face to be near the queen. The type of bee used is a docile European honey bee that rarely stings.

The New Haven Register of August 3, 2006 carried the article "Science Day Shows Merits of Agriculture Research" by Ann DeMatteo. The article reported on Plant Science Day, and focused on research being done by Drs. Lamondia and Krol on biodiesel fuel research. They are growing an eighth of an acre of oil seed to see what the yield would be.

The New Haven Register of August 24, 2006 carried the article "Deadly Virus: elderly City Woman's Death Prompts Warning" by Abram Katz. The death of an elderly woman on August 24 (the first fatality from West Nile Virus in Connecticut in 2006) prompted a warning from city health officials. Dr. Theodore Andreadis said "We collected over 150 West Nile positive pools of mosquitoes at traps located in the three most populous counties in the state". "In addition to the expanding number of locations we continue to identify infected mosquitoes in these areas when trapping is repeated and to isolate the virus from an increasing number of different species".

The Hartford Courant of September 22, 2006 carried the article "When it Rains It's Spores: Fungi Dull Leaf Splendor" by Steve Grant. The foliage display for Fall 2006 was muted by a fungus on leaves of sugar maples and other species. Trees affected by this disease turn brown and fall off prematurely. In an aerial survey of trees it was found that 25,215 acres of trees in the state were affected by anthracnose fungi. Dr. Victoria Smith stated that most of the trees affected were in the northwest hills, but there were patches across the whole state. She also stated that usually there are no long term effects from anthracnose to the trees. Dr. Sharon Douglas said in addition to maples, many oaks, ashes, elms and sycamores have been affected. She also said that property owners should take immediate steps to avoid re-infecting trees next year. Dead leaves should be raked up and removed from the property.

The Hartford Courant of October 24, 2006 carried the article "CT Stats: 26,426 Leaves on a Tree, 2,748 Pounds Per Acre" by Stephen Busemeyer. Dr. Jeffrey Ward and co-workers in the Department of Forestry and Horticulture worked out a formula on how to determine how many leaves were on a tree and how many leaves would be in an acre of forest land and how much they would weigh. Statistics on Northern Red Oak, Yellow Popular, White Oak, Sugar Maple, Sassafras, American Beech, and Black Birch were given.

The Suffolk Times of November 2, 2006 carried the article "Vegetation loss studied: Wetlands in danger of losing roots" by Rebecca Packard. Dr. Wade Elmer is helping determine the cause of sudden wetland dieback – the accelerated extensive loss of wetland vegetation – on the areas of Oyster ponds in Orient, Long Island. Officials there have consulted Dr. Elmer and he has taken samples and is working on finding a cause and a solution to the dieback.

The New Haven Register of December 23, 2006 carried the article "UConn focuses on organic farming" by Cara Baruzzi. The Northeast Organic Farming Association of Connecticut and UConn College of Agricultural and Natural Resources are sponsoring a conference on organic farming at the Connecticut Agricultural Experiment Station on January 13, 2007. Dr. Louis Magnarelli stated "The event will allow those interested in local food production to learn from organic farmers in the region. A growing number of people are interested in organic farming, including farmers who grow the crops and consumers who shop for food grown without pesticides".

The New York Times of December 24, 2006 carried the article "Count Your Blessings: It Wasn't Locusts" by Jan Ellen Spiegel. An unusual bumper crop of pine cones were observed in 2006. Various theories on why were discussed. Dr. Jeff Ward had a theory that the unusually heavy crop of pine cones was caused by the weather. He said various conditions existed from 2005 through 2006 that caused a lot of baby pine cones to form on the trees. And then "All the factors came together, so it was a perfect storm of pine cones".

The Hartford Courant of January 5, 2007 carried the article "Animals and Plants Seemingly Confused" by Steve Grant. 2006 into 2007 was the warmest period on record in Connecticut. The winter of 2007 was snowless and warm up to January, and plants began flowering and animals never went into hibernation. Birds didn't fly south. The article dealt with how animals and plants were handling the situation. Dr. Sharon Douglas stated that many of the plants that were flowering were in south-facing protected areas where warmth was concentrated. She stated that if the plants continued to grow to the point where flower buds were present and then it turned sharply colder, those plants were not going to flower in the spring.

The New Haven Register of March 5, 2007 carried the article "Scientists Find Key to West Nile Tenacity" by Abram Katz. The puzzle of how the West Nile virus survives frigid New England winters to come back and cause infections again the next year has been solved. Both male and female *C. pipiens* mosquitoes inherit the virus from their parents. The female overwinters in a state similar to hibernation and in the spring emerges in search of a blood meal to form her eggs. Dr. John F. Anderson stated "The virus survives in unfed mosquitoes, because the mosquitoes inherit the virus. So the first bite can transmit the virus". Dr. Louis A. Magnarelli stated "It appears that the West Nile virus will remain where it currently exists and that continual monitoring of its activity and spread during the warmer months will be required".

The New Haven Advocate of March 20, 2007 carried the article "Amman's Bonding Moment" by Ken Krayeske. "The Experiment Station is waiting for bonding funds to start renovations and new construction on the Jenkins Building. Renovations are badly needed. Bonding funds are being held up because of a feud between the Governor and Speaker of the House Jim Amman. Both are fighting over who should control bonding funds and where they should be spent. Until the issue is settled, the Station will have to wait for the much needed funding to start upgrading the Jenkins Building.

The Spring 2007 issue of Northern Woodlands carried the article "Butternut Update" by Dan Ruddell. He wrote on the attempt to save butternut trees from a fungus that has been plaguing them, and on a resistant hybrid strain that is found in the area. Dr. Sandra Anagnostakis was quoted as saying that she feels that there are very few true butternuts left in Connecticut. She uses the term "buartnuts" for the hybrids she more commonly encounters, which are often virtually indistinguishable from pure butternut. Hybrid vigor often distinguishes these trees, and it is not clear whether apparent resistance to the fungus is related to that vigor or to possible resistance genes.

The New Haven Register of April 20, 2007 carried a large photograph with the title "Unearthing the secrets of biofuels". The picture showed Dr. James LaMondia giving a talk on the production of oilseed crops for biodiesel production at the Station's Open House on April 18, 2007.

The Hartford Courant of April 23, 2007 carried the article "Trees Stung by Weird Weather: Swings in Temperature Damage Leaves" by Steve Grant. The unusually warm weather through January and then sudden, long lasting cold afterwards, has hurt many trees. Dr. Sharon Douglas said her office is being flooded by calls from people reporting trees and shrubs with dead foliage, and dead ground covers. She stated "Unfortunately, we are dealing with the extreme situation as well". In those cases, not only are needles or leaves dead, but so are the buds and wood. Parts or all of those shrubs or trees could be dead. Her advice was to wait and see - many of the plants and trees may recover in their own time.

The Villager newspapers of April 27, 2007 carried the article "Tis Tick Time of Year" by Bet Zimmerman. The article gave an overall view of Lyme disease, when it was named, and a basic background on how to prevent tick bites. Dr. Louis Magnarelli was interviewed for the article and gave information that the increasing number of deer ticks is due to the huge increase in the number of deer in the state. He has documented the northward movement of both deer ticks and the diseases they carry over time.

The New Haven Register of April 29, 2007 carried the article "Why are honeybees Disappearing?" by Abram Katz. Unusually high declines in honey bees in 27 states is occurring. A drop in 90 percent of some hives is recorded. Scientists and hobbyists are researching the problem, and the cause may be multifaceted. Disease, climate change, mites, pesticides, and stress may all be factors in "colony collapse disorder" also known as "disappearing disease" a couple of decades ago. Dr. Louis A. Magnarelli was interviewed for this article. He cited several causes that the Station was looking into. He also stated that insufficient genetic diversity could be another cause, and he said the Station was monitoring the state's honey bee population carefully.

The Danbury News Times of May 1, 2007 carried the article "Tiny bug may benefit the lake" by Robert Miller. The Candlewood Lake Authority is trying to control or destroy the Eurasian watermilfoil that has begun to take over Candlewood Lake. They plan to set up a research project with Station scientists to see if watermilfoil weevils will be helpful in the control effort. Michell Marko will be working with the Executive Director of the Candlewood Lake Association, Larry Marsicano in isolating a section of the lake and releasing weevils to see if they are effective in the next few years in killing off a significant number of the weeds. It seems to have worked in other lakes. Michele Marko stated "You have to be careful about this. We can't say the weevils are controlling the watermilfoil. We can say the weevils are present there. And the watermilfoil has declined there".

The Hamden Journal of May 2, 2007 carried a photograph of the Spring Glen Garden Club's Arbor Day Celebration. The picture was of Dr. Louis A. Magnarelli, John F.

Anderson, Hamden Mayor Craig Henrici, Anne Bell, President of the Spring Glen Garden Club, Maria Nahom, President of the Federated Garden Clubs of Connecticut, and Donna Nowak, First Vice President of the Federated Garden Clubs. The Spring Glen Garden Club planted a Carolina Silver Belle tree in the Bird and Butterfly Garden at Lockwood Farm, and pledged $2,500 for trees to be planted at a new park adjacent to the new Hamden Middle School.

The New Haven Register of May 6, 2007 carried a photograph of the Spring Glen Garden Club's Arbor Day celebration. The picture was of Dr. Louis A. Magnarelli, John F. Anderson, Hamden Mayor Craig Henrici, Anne Bell, President of the Spring Glen Garden Club, Maria Nahom, President of the Federated Garden Clubs of Connecticut, and Donna Nowak, first Vice President of the Federated Garden Clubs. The Spring Glen Garden Club planted a Carolina Silver Belle tree in the Bird and Butterfly Garden at Lockwood Farm, and pledged $2,500 for trees to be planted at a new park adjacent to the new Hamden Middle School.

The Record-Journal of May 6, 2007 carried a large article on Colony Collapse Disorder, an unexplained disappearance of millions of honey bees in Connecticut and throughout the United States, Canada, and Europe. The first article "Look Ma – No Smoke" by Jeffery Kurz explained what was going on with beekeepers all over the state – their bees leave the hive in search of pollen and disappear forever – they never return to the hive. So far, no explanation has been found although there are many theories. Dr. Kirby Stafford was interviewed for the article. The Station monitors over 3,000 hives throughout the state. He said "We don't know what the cause is yet. There are a number of suspect causes. It may turn out to be a combination of things." "As far as Colony Collapse Disorder goes, we don't know what it is. We haven't seen the impact in Connecticut from it yet."

WTNH-8 carried the news story "Few Cases of Lyme Disease in Connecticut". The story reported that there was a drop in Lyme Disease cases in Connecticut in 2006 compared to 2005. Station staff were quoted as saying it might be due to a 30 percent drop in the number of infected ticks trapped at designated sites throughout the state in 2006. Others said it was because doctors are not reporting all cases of Lyme disease as they are supposed to.

The Source of June 7, 2007 carried the article "What's the Story with the Brazilian Elodea Invasion of Madison?" A homeowner along Old Route 79 had a pond that was being choked with an aquatic weed. He brought the weed to the Station for identification. Roslyn Selsky identified the weed as Brazilian elodea, a plant that is popular with aquarium hobbyists, but rare beyond aquariums. Ms. Selsky stated that in fact there are only six ponds in all of Connecticut where the species has been found. The pond is now under treatment to clear the plant out.

Yankee Magazine, July/August 2007 carried the article "Trouble in Paradise" by Edie Clark. The article gave a history of Lyme disease and the many ways it can be undiagnosed or misdiagnosed and the political bickering going on in the scientific

community. Dr. Kirby Stafford with more than 19 years of research was featured in part of the article.

The Bulletin of the Connecticut Academy of Science and Engineering, Summer Issue, carried the article “Biodiesel Holds Promise as New Energy Source, Economic Boon for Connecticut” by Paul Gough. The article reported on work being done on several fronts to bring the production of biofuel as a new industry to Connecticut. The work of Dr. James LaMondia, Dr. Walter Krol was featured in part of the article. The beginning of research at the Station was when Dr. Louis A. Magnarelli received a request from the state’s Legislature to look into the feasibility of growing crops to be used in biofuel production.

SCIENTIFIC OFFICERSHIPS AND MEMBERSHIPS ON STATE, NATIONAL, OR REGIONAL COMMITTEES

DEPARTMENT OF ANALYTICAL CHEMISTRY

BRIAN EITZER
- Serves on the Advisory Council of New Haven Public School's Sound School

WALTER KROL
- Secretary, New Haven Section of The American Chemical Society
- Member, Interstate Chemical terrorism Workgroup (ICTW)

DAVID STILWELL
- Serves on the Advisory Council of New Haven Public School's Sound School

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

NEIL MCHALE
- Chairman, Institutional Biosafety Committee

RICHARD PETERSON
- Secretary, Quinnipiac Chapter Sigma Xi
- Radiation Safety Officer

NEIL SCHULTES
- Steering Committee at Yale University for Bioethics section of the Institute for Social and Policy Studies
- Masters Research Committee for a student advised by Dr. George Mourad at the University of Indiana/Purdue
- Institutional Biosafety Committee
- Station Health and Safety Committee
- Plant Science Day Committee

DOUG DINGMAN
- Institutional Biosafety Committee
- Station Health and Safety Committee

DEPARTMENT OF ENTOMOLOGY

LOUIS A. MAGNARELLI
- Research Affiliate, Epidemiology and Public Health, Yale University School of Medicine

- Administrative Advisor, Multistate Research Project NE-1019 on nematodes
- Chairman, Legislative Invasive Plants Council
- Member, Legislative Wine Council
- Councilor, Connecticut Academy of Science and Engineering

CHRIS T. MAIER
- Curatorial Affiliate in Entomology, Peabody Museum of Natural History, Yale University
- Member, Advisory Committee, Cooperative Agricultural Pest Survey, USDA
- Member, Archives Committee, Connecticut Entomological Society
- Member, Connecticut Endangered Species Committee, Invertebrate Subcommittee
- Member, Program Committee, Connecticut Pomological Society
- Research Associate, Division of Plant Industry, Florida Department of Agriculture and Consumer Services

VICTORIA SMITH
- USDA-APHIS-CPHST National Plant Pathogen Laboratory Accreditation Program (NPPLAP); member
- USDA National Cooperative Agricultural Pest Survey; Eastern Region Ad Hoc Representative
- National Plant Board/PPQ *Phytophthora ramorum* Working Group; member
- Eastern Plant Board; member
- USDA-APHIS-PPQ Early Detection-Rapid Response Committee; member
- Sustainable Agriculture Research and Education (SARE) Program; Eastern Plant Board representative to the Administrative Council
- New England Wildflower Society, Connecticut Task Force; member

KIMBERLY STONER
- Vice-President, and member of the Board of Directors, Northeast Organic Farming Association of Connecticut
- Representative from Connecticut to the Interstate Council of the Northeast Organic Farming Association
- Chair of the Organic Land Care Committee, a joint project of the Connecticut and Massachusetts chapters of the Northeast Organic Farming Association
- Member, Technical Advisory Committee, Regional Research Project NE-9, Conservation and Utilization of Plant Genetic Resources
- President, Friends of Boulder Knoll

DEPARTMENT OF FORESTRY AND HORTICULTURE

MARTIN P. N. GENT
- Program Chair, New England Vegetable & Berry Growers Conference.
- Associate Editor, Journal of Plant Nutrition.

ABIGAIL MAYNARD
- Ex-Officio Member, Connecticut Council on Soil and Water Conservation
- Member, State Technical Committee
- Editorial Board, Compost Science & Utilization
- Member, Solid Waste Advisory Committee of DEP

WILLIAM R. NAIL
- National Risk Management (Sustainable) Guidelines working group, National Viticulture Extension Leadership.
- Connecticut State Consulting Committee for Agricultural Education.

JEFFREY WARD
- Secretary, Connecticut Tree Protection Examination Board
- Executive Board Member, Connecticut Tree Protection Association
- Executive Board Member, Connecticut Urban Forest Council
- Research Chair, Connecticut Forestland Council
- Ex-Officio Member, Goodwin Scholarship Committee
- Reviewer: Western Journal of Applied Forestry, Forest Ecology and Management, Journal of Sustainable Forestry, University of Tennessee – Cooperative Extension

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

SANDRA L. ANAGNOSTAKIS
- Current Treasurer and Life Member, Northern Nut Growers Association
- Member, Regional Research Project NE-1015, "Biological Improvement, Habitat Restoration, and Horticultural Development of Chestnut by Management of Populations, Pathogens, and Pests"
- Park Naturalist, Sleeping Giant Park Association
- International Registrar for Cultivars of *Castanea*, International Society for Horticultural Science

DONALD E. AYLOR
- Editorial Board, *Agricultural and Forest Meteorology*
- Adjunct Professor, Plant Pathology Department, Cornell University
- Adjunct Professor, Natural Resources Management and Engineering Department, University of Connecticut
- Research Affiliate, School of Forestry and Environmental Studies, Yale University

SHARON M. DOUGLAS
- Member, USDA APHIS PPQ Cooperative Agricultural Pest Survey Committee (CAPS) for Connecticut
- Member, Institutional Biosafety Committee, The Connecticut Agricultural Experiment Station

WADE H. ELMER

- Past President, Northeastern Division, The American Phytopathological Society, 2006-2007
- Chair, Nomination Committee, Northeastern Division, The American Phytopathological Society, 2006-2007
- Member, Program Committee, Connecticut Greenhouse Growers Association, 1988-present
- Member, Northeast Research, Extension and Academic Program Committee for Integrated Pest Management, 2006-present
- Ph.D. Committee Member of Anathep Pasura, Department of Plant Science, University of Connecticut, Storrs, CT
- Ph.D. Committee Member of Cheng Hua Huang, Department of Plant Pathology, University of Florida, Gainesville, FL

FRANCIS J. FERRANDINO

- Member, Epidemiology Committee, The American Phytopathological Society
- Chairman, Student Awards Committee, Northeastern Division, The American Phytopathological Society

DEPARTMENT OF SOIL AND WATER

- THEODORE G. ANDREADIS
- Lecturer in Epidemiology and Public Health, Yale University School of Medicine
- Adjunct Professor, Department of Pathobiology, University of Connecticut
- Member, Multi-State Research Project S-1024, "Discovery of Entomopathogens and Their Integration and Safety in Pest Management Systems"
- Member, Editorial Board, *The Journal of Eukaryotic Microbiology*
- Member, State of Connecticut Mosquito Management Program
- Member, Peabody Fellows Biodiversity and Human Health Program, Yale University

- GREGORY J. BUGBEE
- Director, New England Aquatic Plant Management Society
- Director, Clear Lake Improvement Association
- Member, Northeast Soil Testing Committee, NEC-67
- Member, Government Affairs Committee, New England Aquatic Plant Management Society

- JOSEPH J. PIGNATELLO
- Adjunct Professor in Environmental Engineering, Department of Chemical Engineering, Yale University
- Associate Editor, *Environmental Engineering Science.*

- Member of W-82 Multi-State Project "Pesticides and Other Organics in Soil and Their Potential for Groundwater Contamination"
- Incoming Chair, Division S-11 (Soils and Environmental Quality) Soil Science Society of America

- CHARLES R. VOSSBRINCK
- Visiting Assistant Professor, Department of Pathology, Albert Einstein College of Medicine, Yeshiva University, Bronx, New York.
- Member, Multi-State Project S-1024, "Discovery of Entomopathogens and Their Integration and Safety in Pest Management Systems"

JASON C. WHITE
- Managing Editor, *The International Journal of Phytoremediation.*
- Member, Editorial Board, *Environmental Pollution.*
- Member, Editorial Board, *Environmental Toxicology and Chemistry*
- Member, Executive Committee, *International Phytotechnology Society*
- Member, Scientific Advisory Board, *Association for Environmental Health and Sciences*

VALLEY LABORATORY

JOHN F. AHRENS
- Advisor and Director, National Christmas Tree Growers Association
- Member, National IR-4 Committee (Interregional Committee No. 4) that prioritizes pesticide registration needs for ornamental crops.

RICHARD S. COWLES
- Japanese Beetle Harmonization Agreement Treatment Committee
- Treasurer, Connecticut Entomological Society

- JAMES A. LAMONDIA
- Member and Webmaster, Northeast Regional Project NE-1019, "Alternative management systems for plant-parasitic nematodes in horticultural and field crops"
- Senior Editor, Journal of Nematology
- Editor, Tomato & Potato Section; Biological and Cultural Tests for Control of Plant Diseases
- Ex-Officio Member, Connecticut Tree Protection Examining Board.
- Worker Protection Standards Trainer for the Valley Laboratory.
- North American Blue Mold Forecast Center State Coordinator
- Society of Nematologists Honors and Awards Committee Chair
- Society of Nematologists Extension Committee
- Member, Cooperative Agricultural Pest Survey Committee

DEWEI LI

- Board Member of the Analytic Accreditation Board of American Industry Hygiene Association (AIHA).

TODD L. MERVOSH

- Connecticut Invasive Plant Working Group – Member of Steering Committee & Symposium Planning Committee, Chair of Stewardship Committee.
- Northeastern Weed Science Society – Chair of Nominating Committee
- Weed Science Society of America – Member of Weed Alert Committee and Herbicides for Minor Uses Committee

THOMAS M. RATHIER

- Advisory Board for Community Gardens in Hartford, Knox Parks Foundation
- Advisory Board, Agri-Science, Bloomfield High School
- Member, Cooperative Agricultural Pest Survey Committee
- Science Liaison, Connecticut Christmas Tree Growers Association
- Member, Concentrated Animal Feeding Operation Committee, EPA
- Advisor, USDA Natural Resource Conservation Service.
- Member, Education Subcommittee, Connecticut Tree Protective Association

LECTURES, SEMINARS, AND INTERVIEWS

During the year, staff members present formal lectures and seminars to members of civic groups outside the Station. They also describe their research to residents who visit the Station and occasionally report on their research to elected officials. At other times, newspaper, radio and TV reporters interview our staff. These occasions are listed below.

ABBEY, TIMOTHY

- Presented the talk "What's Living in Your Potting Media?" at the CGGA/CNLA program Getting to the Root of the Matter: Growing Healthy Plants in Container Production in New Haven *July 20, 2006*
- Gave a short presentation on "Plant Health Care for the Connecticut Nursery and Landscaping Industries" and staffed the corresponding display at Plant Science Day in Hamden *August 2*
- Designed the display "Native Ornamental Plants" that was present in the New England Center Building at the Big E from *September 15-October 1*
- Presented the talk "Arthropod and Pest Management Update" at the CAES Valley Laboratory Tour in Windsor *September 19*
- Gave the presentations "Introduction to Plant Diseases" and "Introduction to Ornamental Insect Pests" at the Connecticut Nursery and Landscape Association Nursery Accreditation Program in Southington *October 3, 17, and 24*
- Served as a moderator at the Connecticut Invasive Plant Working Group Invasive Plant Workshop in Wallingford *October 12*
- Gave the presentation "Why Trees Fall Apart: Insects, Diseases & Injury" to the Connecticut Tree Warden School in Middlefield *October 13*

AHRENS, JOHN

- Gave the presentation "The Latest on Herbicides for Christmas Trees" to the 50th Annual NH/VT Christmas Tree Growers' Association Meeting, Hampton Falls, NH (120 attendees) *September 27, 2006*
- Participated in the National IR-4 Project 2006 Ornamental Horticulture Workshop in Denver, CO to set priorities and secure data to enable herbicide registrations for ornamental crops *October 10-12*
- Participated in his 50th consecutive meeting of the Northeastern Weed Science Society in Baltimore, MD *January 2-5, 2007*
- Presented a paper on "2006 Weed Management Trials in Christmas Trees", gave two talks "Weed Control Options for Field Nurseries" and "Herbicide Options for Deciduous and Evergreen Trees and Shrubs", and co-authored two other papers at the Central Environmental Nursery Trade Show (CENTS) in Columbus, OH *January 21*
- Presented the talk "Christmas Tree Herbicide Update" at the 2007 Christmas Tree Management meeting at State College, PA *February 14*

ANAGNOSTAKIS, SANDRA L.

- Reported on her chestnut and butternut research to the Forest Health Program Review Panel in Jones Auditorium (20 attendees) *August 8, 2006*
- Discussed her chestnut breeding work at the Nursery Tour at the Valley Lab in Windsor *September 19*
- Reported on her butternut work at the Forest Cooperators Meeting at the Colony Inn in New Haven (25 attendees) *September 26*
- Gave a talk entitled "The return of the chestnut" at the Connecticut Forest Research Forum at UCONN in West Hartford (200 attendees) *September 28*
- With Pamela Sletten, conducted a tour of the chestnut plantation at Sleeping Giant for the Spring Glen Garden Club (20 attendees) *October 5*
- Reported on her butternut research for the last two years at the Research Symposium on Butternut Canker Disease (co-sponsored by the USDA and their Canadian counterpart) in Niagara Falls, Ontario, Canada (42 attendees) *October 16-19*
- Reported on her chestnut research at the Annual Meeting of the Multistate Research Project NE-1015, "Biological improvement, habitat restoration, and horticultural development of chestnut by management of populations, pathogens, and pests" in Shepherdstown, WV (33 attendees) *October 26-29*
- Gave the talk "History of Chestnut Restoration in Connecticut" at the Annual Meeting of the Connecticut Chapter of the American Chestnut Foundation in New Haven (32 attendees) *November 11*
- Spoke about "Canker diseases of trees" to a Botany class from Quinnipiac University in Jenkins (12 attendees) *November 13*
- With Pamela Sletten, was interviewed about chestnut as a food crop and techniques for growing chestnut trees by Laurie Sanders for a National Public Radio program to be produced by Massachusetts Public Radio *November 27*
- Judged 94 categories of nuts in the Nut Exhibits at the Pennsylvania Farm Show in Harrisburg, PA *January 5, 2007*
- Spoke on "Butternut research at CAES" at the Annual Winter Meeting of the Connecticut Tree Protective Association at the Aqua Turf Club in Plantsville (810 attendees) *January 18*
- Reported on her research on chestnut, butternut, and black birch at the Forest Health Meeting in Jones (40 adult attendees) *February 22*

ANDREADIS, THEODORE G.

- Was interviewed about mosquitoes and West Nile virus by Fox 61 Television *July 6, 2006*
- Was interviewed about the first detection of West Nile virus infected mosquitoes in West Haven by Bob Miller of the Danbury News Times *July 11*
- Was interviewed about the first detection of West Nile virus infected mosquitoes in West Haven by Fran Schneido of CBS Radio, NY *July 11*
- Was interviewed about the first detection of West Nile virus infected mosquitoes in West Haven by John Silva of Metro News *July 12*
- Was interviewed about the first detection of West Nile virus infected mosquitoes in West Haven by Steve Kalb of CT Radio Network *July 12*

- Was interviewed about the first detection of West Nile virus infected mosquitoes in West Haven by Marianne Gail Brown of the CT Post *July 12*
- Was interviewed about the collection of West Nile virus infected mosquitoes in New Haven by Steve Kotchko of CT Public Radio *July 26*
- Was interviewed about the collection of West Nile virus infected mosquitoes in New Haven by Lauren Petty of NBC 30 TV *July 26*
- Was interviewed about the collection of West Nile virus infected mosquitoes in Greenwich by Fran Schneido of CBS Radio, NY *July 28*
- Was interviewed about the collection of West Nile virus infected mosquitoes in Greenwich by WNLK Radio, Norwalk *July 28*
- Was interviewed about West Nile virus activity in Connecticut in 2006 by John Holtz, of the New York Times *July 31*
- Was interviewed about mosquitoes and West Nile virus by Ann DeMatteo of the New Haven Register *August 2*
- Was interviewed about mosquitoes and West Nile virus by Jeff Holtz of the New York Times *August 3*
- Was interviewed about mosquitoes and West Nile virus by Nancy Cohen of Connecticut Public Radio *August 3*
- Was interviewed about mosquitoes and West Nile virus by Nanci Hutson of the Danbury News Times *August 3*
- Was interviewed about the first human case of West Nile virus for the year in Bristol, CT by Marc Sims of Connecticut Public Radio *August 4*
- Was interviewed about the first human case of West Nile virus for the year in Bristol, CT by Fran Schneido of CBS Radio, NY *August 4*
- Was interviewed about the first human case of West Nile virus for the year in Bristol, CT by Debra Bogstie of NBC-30 TV *August 4*
- Was interviewed about the first human case of West Nile virus for the year in Bristol, CT by Leon Collins of WFSB TV3 *August 4*
- Was interviewed about the first human case of West Nile virus for the year in Bristol, CT by the Norwich Bulletin *August 4*
- Was interviewed about West Nile virus infections in horses by Sharon Smith of Quarter Horse Journal *August 23*
- Was interviewed about the first West Nile virus human fatality by Bob Miller of the Danbury News Times *August 23*
- Was interviewed about the first West Nile virus human fatality by the Associated Press of Hartford *August 23*
- Was interviewed about the first West Nile virus human fatality by Steve Kotchko of Connecticut Public Radio *August 23*
- Was interviewed about the human cases of West Nile virus by Brian Burnell of New England Cable News *August 24*
- Was interviewed about the human cases of West Nile virus by Shawn Philips of NBC 30 *August 24*
- Was interviewed about the human cases of West Nile virus by Hartford Metro News *August 24*

- Was interviewed about the 2nd human case of West Nile virus in New Haven by Abe Katz of the New Haven Register *August 28*
- Was interviewed about the cluster of human cases of West Nile virus in the New Haven area by Jeff Holz of the New York Times *August 29*
- Was interviewed about the cluster of human cases of West Nile virus in the New Haven area by Anna Gustafson of the Norwalk Hour *August 29*
- Was interviewed about the cluster of human cases of West Nile virus in the New Haven area by John Charlton of Fox 61 *August 30*
- Was interviewed about the status of West Nile virus in Connecticut and the mosquito trapping and testing program by Jim Moore of the Waterbury Republican *August 30*
- Was interviewed about the cluster of human cases of West Nile virus in the New Haven area by Nancy Hudson of the Danbury News Times *August 30*
- Discussed the situation of West Nile virus in Connecticut as a guest on the talk show "Going Beyond the Headlines" with Dr. James Hadler of the CTDPH and moderator Lori Perez *August 31*
- Was interviewed about adult mosquito pesticide spraying in the greater New Haven area by Abe Katz of the New Haven Register *August 31*
- Was interviewed about the first detection of Eastern Equine Encephalitis virus in Stonington by Judy Benson of The Day *August 31*
- Was interviewed about the detection of Eastern Equine Encephalitis in Stonington by Kent Pierce of WTNH-TV8 *September 1*
- Was interviewed about mosquitoes and Eastern Equine Encephalitis in Connecticut by Toby Henry of the Union Leader *September 14*
- Was interviewed about the overall West Nile virus activity in Connecticut for the 2006 season by Fran Schneido of CBS Radio, NY *September 26*
- Met with State Representative Louis P. Esposito of West Haven and officials from DEP to conduct an on-site inspection of a wood lot in West Haven for potential mosquito habitat. He was assisted by Michael Thomas *October 11*
- Presented an overview of the State Mosquito/Arbovirus Surveillance Program and West Nile virus to a group of 6 high school teachers from Lyman Hall in Wallingford *November 6*
- Presented a lecture entitled "West Nile virus: An exotic, emerging mosquito-borne disease in the western hemisphere" to a class of students at Post University in Waterbury (30 attendees) *November 8*
- Presented an invited talk entitled "Arbovirus Activity in Connecticut 2006: A resurgence of West Nile virus" at the 52nd Annual Meeting of the Northeastern Mosquito Control Association held in Saratoga Springs, NY (150 attendees) *November 27*
- Presented an overview of the CAES Mosquito/Arbovirus surveillance and research programs to Tom Tate and Kitty Cardwell of USDA CSREES *January 24, 2007*
- Presented an overview of the CAES Mosquito/Arbovirus surveillance and research programs to Dr. Ron Lacewell and Alan Jones of Texas A&M University *January 31*
- Was interviewed about the recent discovery of the overwintering mechanisms of West Nile virus by Marc Sims, CT Public Radio *February 28*

- Was interviewed about recent research on the over wintering mechanisms of West Nile virus in mosquitoes by Steve Clark, Stamford Advocate *March 1*
- Hosted Dr. Randy Gaugler and a group of 5 scientists and graduate students from The Center for Vector Biology at Rutgers University and presented an overview of the CAES mosquito/arbovirus surveillance and research programs *March 2*
- Hosted a group of 12 public health and mosquito control officials from Massachusetts and presented an overview of the CAES mosquito/arbovirus surveillance and research programs *March 7*
- Was interviewed about recent research on the over wintering mechanisms of West Nile virus in mosquitoes by Bob Miller, Danbury News Times *March 13*
- Was interviewed about the CAES Electron Microscope Facility and associated research activities by the New Haven Advocate *March 15*
- Discussed current collaborative research activities with mosquitoes and arboviruses with Dr. Kenneth Linthicum and 7 research scientists within the Mosquito and Fly Section at the USDA/ARS Center for Medical, Agricultural and Veterinary Entomology Laboratory in Gainesville, FL *March 30*
- Presented two talks entitled "Host feeding patterns of mosquito vectors of West Nile virus in the northeastern US" and "Molecular identification of the blood meal sources of the *Culiseta* vectors of Eastern Equine Encephalitis in an endemic focus in New York" at the 73rd Annual Meeting of the American Mosquito Control Association (1,000 attendees) *April 2*
- Was interviewed about Eastern Equine Encephalitis and West Nile virus vaccines for horses by Mariann Gail Brown of the Connecticut Post *April 13*
- Presented an invited lecture entitled "West Nile virus: An exotic emerging mosquito-borne disease in the western hemisphere" at the Holcomb Farm Learning Center, Granby (8 attendees) *April 18*
- Presented a display on "West Nile virus" at Sikorsky Aircraft Earth Day Celebration, Stratford (500 attendees) *April 19*
- Participated in a meeting of the Advisory Board of the Peabody Fellows Biodiversity and Human Health Program" held at Yale University (12 attendees) *April 24*
- Was interviewed about spring mosquitoes by Fran Schneido of CBS Radio, New York *April 30*
- Was interviewed about human cases of West Nile virus in 2006 by Steven Kobak of the Stamford Advocate *May 1*
- Presented an overview of the Station's research and surveillance program on mosquitoes and arboviruses to Dr. Daniel Rossi, Executive Director, Northeastern Regional Association of State Agricultural Experiment Station Directors *May 7*
- Was interviewed about the State Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis viruses by the New Haven Register *May 21*
- Was interviewed about spring mosquitoes and the outlook for the 2007 season by WTIC Radio *May 22*
- Was interviewed about mosquitoes, mosquito-borne diseases and the State Mosquito Trapping and Testing Program by Sam Gingerella, WTIC Radio *May 30*
- Was interviewed about the impact of West Nile virus on birds by freelance writer Robert Tougias *June 4*

- Was interviewed about West Nile virus and eastern equine encephalitis by Kate Carey, Backus Hospital Healthy Connections Magazine *June 6*
- Was interviewed about mosquitoes and West Nile virus n Connecticut by Jason Austin, Metro News *June 18*
- Was interviewed about mosquitoes and West Nile virus by Adam Bolger of the Hartford Advocate *June 27*

ARMSTRONG, PHILIP M.
- Presented a talk entitled "Diversity of Mosquito-borne Viruses in Connecticut" at Plant Science Day, held at Lockwood Farm in Hamden *August 2, 2006*
- Presented an abstract "Local overwintering of Eastern Equine Encephalitis virus variants in Connecticut" at the 55th Annual Meeting of the American Society for Tropical Medicine and Hygiene in Atlanta, GA (1,000 attendees) *November 12-16*
- Gave a lecture entitled "Responding to the West Nile virus epidemic in Connecticut" for a class on risk analysis and communication at Smith College, Northampton, MA (15 attendees) *November 30*
- Gave the lecture "Surveillance of West Nile virus in Connecticut" to the Yale Flavivirus Study Group at the Connecticut Agricultural Experiment Station *January 23, 2007*
- Gave a tour of the BSL-3 Laboratory and described virus isolation and identification techniques to Dr. Randy Gaugler and a group of 5 scientists and graduate students from The Center for Vector Biology at Rutgers University *March 2*
- Gave a tour of the BSL-3 Laboratory and described virus isolation and identification techniques to 12 public health and mosquito control officials from Massachusetts *March 7*

ARSENAULT, TERRI
- Participated in a tour of the mobile counter-terrorism laboratory designed and operated by Hamilton Sundstrand at their Windsor Locks facility *November 17, 2006*
- Participated in a meeting of the FDA Food Emergency Response Network (FERN) Cooperative Agreement (CAP) Laboratories in Phoenix, AZ *January 23-25, 2007*

AYLOR, DONALD E.
- Gave a lecture entitled "Aerial transmission of plant disease" at the Yale School of Forestry and Environmental Studies (32 attendees) *April 4, 2007*
- Gave an invited talk entitled "Aerial dispersal of maize pollen" at Monsanto's Mystic Research Center in Mystic (35 attendees) *May 24*

BARSKY, JOSEPH P.
- Participated in the Connecticut Forest Research Forum: From Laboratory to Field, in West Hartford *September 28, 2006*
- Gave a presentation on "Planting Fall Bulbs" to the 4-H Club at Eli Whitney Technical High School in Hamden (17 attendees) *November 13*
- Participated in the 85th Annual Meeting of the Connecticut Tree Protective Association in Plainville *January 18, 2007*

- Participated in the annual meeting of the Yankee Society of American Foresters in Enfield *February 15*
- Served as Public Information Officer during Incident Command Training Full Scale Exercise (FY-2007-2 Emerald Ash Borer) in Burlington *March 5-7*
- Met with officials from The Nature Conservancy, Highstead Arboretum and Aquarion Water Company to discuss Japanese barberry removal strategies and white-tailed deer research *March 22*
- Presented posters of forestry and wildlife research at Earth Day at Sikorsky (20 attendees) *April 19*

BHARDWAJ, ANUJA

- Presented a poster with Kirby Stafford, III on research with the fungus *Metarhizium anisopliae* for tick control at the annual meeting of the Entomological Society of America in Indianapolis, IN *December 12, 2006*
- Staffed an exhibit on ticks at Sikorsky in Stratford *April 19*

BLEVINS, TIA

- Helped staff the Station booth at the Big E in Springfield, MA *September 27, 2006*
- Helped staff the Station booth at the CNLA Winter Symposium in Wallingford, CT *January 3-4, 2007*
- Helped staff the Station booth at the Annual Connecticut Tree Protective Association's meeting in Southington, CT *January 8*
- Participated in the full scale exercise of the Incident Command System conducted by the Professional Development Center of the USDA APHIS PPQ in Burlington, CT *March 6-9*
- Participated in an instructional course for Digital Aerial Sketch mapping conducted by the USDA Forest Service at the Urban Forestry Center in Portsmouth, NH *May 22*

BOMBA-LEWANDOSKI, VICKIE

- Hosted a tour of Lockwood Farm for 20 high school teachers from Southern Connecticut State University for the ISIS Program *July 6, 2006*
- Hosted a CAES tour for 15 high school students from the Education Connection Program sponsored by the University of New Haven *July 13*
- Set up a CAES display at the Ward Heitmann House in West Haven, dismantling it at the end of the event *July 14, 17*
- Helped with the logistics of running Plant Science Day at Lockwood Farm *August 2*
- Helped to coordinate the Station's booth at Celebrating Agriculture in Woodstock *September 23*
- Coordinated and manned the Station's booth at the Big E, West Springfield, *MA September 27, 28*
- Participated in a meeting of the Planning Committee for Farm City Week, Derby *October 3*
- Participated in a meeting of the Planning Committee for Farm City Week, Derby *November 14*

- Set up and coordinated the Station's booth at the Connecticut Flower and Garden Show in Hartford *February 21, 2007*
- Coordinated the Station's booth at The Garden Expo held in Fairfield Ludlowe High School, Fairfield *March 17*
- Coordinated the Station's booth and manned it at Ag Day at the Capitol in Hartford *March 21*
- Coordinated, set up, and helped man the Station's booth at CPTV Family Science Expo at the Expo Center, Hartford *April 26, 27, and 28*
- Participated in Farm City Week at Jones Family Farms in Shelton *May 15, 16, and 17*

BONITO, ROSE

- Presented a display on the Bird and Butterfly Garden, Aquatic Invasive Plants, *P. ramorum* blight, and other current research projects and distributed Station literature for "Celebrating Agriculture" at the Woodstock Fairgrounds in Woodstock (950 attendees at the booth) *September 23, 2006*
- Helped staff the Station booth at the Big E in Springfield, MA *September 27*
- Set up a display and worked the Station's exhibit at the 26th Annual Flower and Garden Show at the Connecticut Convention Center, Hartford *February 22-25, 2007*
- Set up and helped with an exhibit at the annual Garden Expo in Fairfield (3,000 attendees) *March 17-18*
- Staffed an exhibit on honey bees and biodiesel at the CPTV Family Science Expo in Hartford *April 28*
- Set up a display table with Station information and poster of the Bird and Butterfly Garden for the "Annual Bird and Butterfly Gardening Plant Sale" held at the Peabody Museum in New Haven (125 adult and 53 children attendees) *May 12*

BUGBEE, GREGORY J.

- Was interviewed about controlling Eurasian water milfoil in Candlewood Lake by Bob Miller of the Danbury Times *July 11, 2006*
- Gave an update on CAES work on controlling variable milfoil in Bashan Lake to the Bashan Lake Association at the East Haddam Town Hall (50 attendees) *July 22*
- Spoke to the Tyler Lake Association on managing nuisance aquatic vegetation in Goshen (12 attendees) *July 28*
- Participated in the Northeast Aquatic Plant Management Society Board of Directors Pre-Conference Planning Session at Mount Snow, VT *September 11*
- Was interviewed about managing Eurasian water milfoil by Avi Salsman of the New York Times *September 14*
- With Roslyn Selsky and Dr. Michelle Marko presented a talk to the CT DEP staff in Hartford on the Station's Invasive Aquatic Plant Control Program (50 attendees) *September 21*
- With Roslyn Selsky, presented results of the CAES Aquatic Plant Survey of Candlewood Lake to the Candlewood Lake Advisory Committee at the Northeast Utilities headquarters in Sharon, CT *October 11*

- With Roslyn Selsky and Dr. Michelle Marko hosted the annual meeting of the Connecticut Federation of Lakes in Jones Auditorium and gave an update on the CAES Invasive Aquatic Plant Program (50 attendees) *October 21*
- Spoke about the CAES Invasive Aquatic Plant Program to a group of 6 high school teachers from Lyman Hall in Wallingford *November 6*
- Demonstrated soil testing to students from Hamden High School who were working on a science project (3 attendees) *November 7*
- Spoke to members of the Quaddick Lake Association on methods for controlling nuisance aquatic vegetation (12 attendees) *November 8*
- Spoke on improving soil in the home garden to the Middletown Garden Club (50 attendees) *November 15*
- Spoke on managing nuisance vegetation in ponds and lakes at the Annual Meeting of the Environmental Industry Council in Southington, (150 attendees) *November 21*
- Gave a lecture on managing athletic fields to students at a course at Southern Connecticut State University (35 attendees) *November 27*
- Presented a course on soils to the Federated Garden Club in Jones Auditorium (50 attendees) *November 29*
- Spoke on "Aquatic Weed Control Options in Pattagansett Lake" to a group of 12 citizens and State Representative Ed Jutila in East Lyme *January 10, 2007*
- Spoke on "Aquatic Weed Options for Crystal Lake" at a town meeting held at Middletown High School (approximately 40 attendees) *January 11*
- With Roslyn Selsky, administered the supervisory aquatic license recertification program at the Northeast Aquatic Plant Management Society Annual Conference at Mount Snow, Vermont (50 attendees) *January 16*
- Spoke on Managing Nuisance Vegetation in Lakes and Ponds" at the Connecticut Turf and Landscape Conference at Adrian's Landing in Hartford (75 attendees) *February 1*
- Staffed a Station booth at the Connecticut Turf and Landscape Conference at the Connecticut Convention Center *February 1*
- Gave a seminar entitled "An Arborists Guide to Soils" at the Bartlett Aboretum in Stamford (35 attendees) *February 8*
- Gave a talk on "Aliens from the Deep: CAES Invasive Aquatic Plant Program" at Lunch Club (25 attendees) *February 13*
- Participated in a meeting of the Lake Candlewood Technical Committee held at the headquarters of First Light Power Resources in Sherman *February 20*
- Presented a poster entitled CAES Invasive Aquatic Plant Program at the Connecticut Conference on Natural Resources at UCONN (300 attendees) *March 9*
- Presented a seminar on Caring for Athletic Fields to a class of recreation and leisure majors at Southern Connecticut State University (20 attendees) *March 13*
- Spoke on Controlling Aquatic Vegetation in Ponds at a meeting of the Branford Land Trust (12 attendees) *March 14*
- Was interviewed about using manure in the garden by Pamela Weil of the Connecticut Gardener *April 9*
- Spoke on "Management and Control of Invasive Aquatic Plants" at a conference entitled "Beneath the Surface: Understanding the Lakes We Love" co-hosted by the

Town of Woodstock Conservation Commission and Quinebaug-Shetucket Heritage Corridor Inc. (100 attendees) *April 26*

- Spoke on the plant survey performed by CAES IAPP and nuisance vegetation control to the Indian Lake Association (25 attendees) *June 5*
- Instructed students on how to survey Candlewood Lake for plants and milfoil weevils as part of Project CLEAR. This meeting was held at the Candlewood Lake Authority Headquarters in Sherman, CT (50 attendees) *June 21-22*
- Hosted the CAES Aquatic Plant Workshop in Jones Auditorium. Spoke on "Management of Nuisance Aquatic Plants (14 attendees) *June 23*
- Spoke on "Invasive Aquatic Plants" at a invasive plant symposium held at the Jewish Community Center in Sherman, CT (30 attendees) *June 24*

CHEAH, CAROLE

- Presented a summary of biological control efforts at Bigelow Hollow State Park to an official of the DEP *July 3, 2006*
- Gave presentations on hemlock woolly adelgid and biological control to middle and high school students from New York City attending the Great Mountain Forest Summer Ecology Program (20 attendees both dates) *July 11 and 26*
- Gave a tour of the Kenneth White Memorial Insectary at the Valley Laboratory to the students and councilors of the Great Mountain Forest Summer Ecology Program (20 attendees) *July 26*
- Gave an update of current hemlock woolly adelgid biological control efforts in CT to arborists at the CTPA Summer Meeting at the Farmington Club *July 20*
- Gave 2 talks for the pesticide Credit Tour and Walking Tour on biological control of hemlock woolly adelgid at Plant Science Day at Lockwood Farm in Hamden (25 attendees) *August 2*
- Gave a presentation on biological control of hemlock woolly adelgid in Connecticut to the USDA Forest Service for the Forest Health Program Review (10 attendees) *August 8*
- Gave a presentation on artificial diet development for hemlock woolly adelgid predators and attended the hemlock woolly adelgid Steering Committee Meeting at Avon Old Farms Hotel, Avon (20 attendees) *August 29*
- Was interviewed about biological control of hemlock woolly adelgid and the recovery of hemlocks by Bob Miller of the News Times *September 8*
- Was interviewed about biological control of hemlock woolly adelgid and the recovery of hemlocks by Morgan Simmons of the Knoxville Sentinel Times *September 13*
- Gave an evening presentation on hemlock woolly adelgid at the Eleanor Wolf Buck Nature Center in Wethersfield (4 attendees) *September 14*
- Gave a presentation on biological control of hemlock woolly adelgid at the Nursery and Landscape Research Tour of the Valley Laboratory in Windsor (60 attendees) *September 19*
- Gave a presentation on biological control of hemlock woolly adelgid at the 2006 State Forest Health Cooperators Meeting in New Haven (20 attendees) *September 26*
- Was interviewed at the Valley Laboratory about hemlock woolly adelgid and biological control by Elizabeth Hunter and Doug Hibschman, freelance writers from

North Carolina for a book on hemlock woolly adelgid and biological control *October 11*

- Presented two talks on artificial diet developments for HWA predator, *Sasajiscymnus tsugae* and the hemlock woolly adelgid at the hemlock woolly adelgid Biological Control Technical Committee Meeting at Annapolis, MD (100 attendees) *January 9, 2007*
- Was interviewed for a book on hemlock woolly adelgid by Elizabeth Hunter from North Carolina *January 15*
- Gave a summary of biological control of hemlock wooly adelgid to a consulting forester and property owners in Winchester *January 29*
- Gave a presentation on biological control of hemlock woolly adelgid in Connecticut at the Forest Health Monitoring Workshop, New Haven (40 attendees) *February 22*
- Was interviewed by Ellen Castaldini of Clean Air-Cool Planet and Clean Water Action/CT Climate Coalition for a Global Warming publication statement *March 5 and 12*
- Gave a report and update on the HWA biological control research to officials from the Natural Resources Administration of the Metropolitan District Commission and from MDC Headquarters, Barkhamsted *March 9*
- Met with an official from DEP at Cockaponsett State Forest Headquarters to discuss HWA biological control releases *March 27*
- Gave a report of hemlock research to the Forest Manager for Great Mountain Forest, Norfolk, CT *April 23*
- Gave an update and provided information to the Forest Health District from MA Department of Conservation and Recreation on adelgid winter mortality *May 3*
- Gave a summary of hemlock woolly adelgid scouting efforts to a DEP official at Bigelow Hollow State Park *May 7*
- Presented hemlock woolly adelgid and biological control information and reports to an official of the DEP at the Valley Laboratory *May 17, 2007*
- Was interviewed on climate warming effects on adelgid trends by Matt Heid for Appalachian Mountain Club Outdoor Magazine *May 30*

COWLES, RICHARD

- Gave the talk “Insect Management in Christmas Trees” to the Connecticut Christmas Tree Growers” at their summer meeting at the Valley Laboratory, Windsor (50 attendees) *July 11, 2006*
- Presented “Monitoring and Management of Turf Insects” in the demonstration tent at Plant Science Day held at Lockwood Farm in Hamden (60 attendees) *August 2*
- Presented “Chemical Control of hemlock woolly adelgid” for the walking tour at Plant Science Day (10 attendees) *August 2*
- Provided the update “Chemical Control of hemlock woolly adlegid” at the Forest Health Program Review in New Haven (15 attendees) *August 8*
- Gave the talks “Chemical Control of hemlock woolly adelgid” and “Managing Juniper Tip Dwarf Mites” at the Valley Laboratory Nursery and Landscape Field Day in Windsor (54 attendees) *September 19*

- Gave an update "New Products for Chemical Control of Christmas Tree Insect and Mite Pests" to the 50th Annual NH/VT Christmas Tree Growers' Association Meeting, Hampton Falls, NH (120 attendees) *September 29*
- Presented the lecture "Biology and Management of Insects Affecting Trees and Shrubs", a 2 ½ hour lecture for the University of Massachusetts Green School, Milford, MA (70 attendees) *November 13*
- Presented "Prospects for Using Plant Growth Regulators in Managing Soil-Dwelling Insect Pests of Strawberries" to the New England Vegetable and Berry Growers' Association (120 attendees) *January 5, 2007*
- Presented "Ramifications of Pyrethroid Resistance for Annual Bluegrass Weevil Management", "Chemical Control of Hemlock Wooly Adelgids", and "White Pine Weevil Management" to the Eastern PA Turfgrass Conference, King of Prussia (400 attendees) *January 11*
- Presented the talk "Principles of Insect and Mite Management for Trees and Shrubs", "Organic Management of Turf Insects", and "A Pest Management Walking Tour" for the Organic Land Care Seminar for the Massachusetts Northeast Organic Farm Alliance, Leominster, MA (80 attendees first two talks, 40 attendees for third activity) *January 16*
- Spoke about "Chemical Control of hemlock woolly adelgid" at the CT Tree Protective Association Winter Meeting, Plantsville, CT (500 attendees) *January 18*
- Gave the talk "Organic Management of Turf Insects" to the Organic Land Care Seminar for the Connecticut Northeast Organic Farm Alliance, New Haven (50 attendees) *February 5*
- Gave the talks "Mite Management" and White Grub Management" for the Pennsylvania Christmas Tree Growers' Short Course, State College, PA (130 attendees) *February 13 and 14*
- Gave two 75 minute presentations "Insects of Trees and Shrubs: Introduction to chewing pests" and "Insects of Trees and Shrubs: Sucking pests and gall makers" for the Save-A-Tree Plant Health Care Workshop (60 attendees) *February 28*
- Presented the talk "Update on Christmas Tree insect pest management" at the annual winter meeting of the Connecticut Christmas Tree Growers Association, Middletown (100 attendees) *March 3*
- Gave the invited talk "Imidacloprid and Management of hemlock woolly adelgid in Forests: Fine Tuning for Environmental Stewardship" for the Sustainable Forest Pest Management Symposium, at the American Chemical Society National Meeting, Chicago, IL (20 attendees) *March 28*
- Presented "White grub biology and control" to the Garden Gate Club of Mansfield (30 attendees) *April 16*
- Reported on progress on the management of annual bluegrass weevil at the Northeast Regional Hatch Project (NE-1025) Meeting, Geneva, NY (20 attendees) *May 8*
- Was interviewed about the possible impact of global warming on hemlock woolly adelgid and on hemlock woolly adelgid biology and management by Matt Heid, Senior Editor of AMC Outdoors Magazine *May 30*
- Discussed insect and mite pests at a summer meeting of the CT Christmas Tree Growers' Association, Berlin (50 attendees) *June 6*

- Presented the talk “Hemlock woolly adelgid and its management” at Valent corporation’s biennial ornamentals workshop, Moran, WY (20 attendees) *June 26*
- Spoke about insect and mite pests at a summer meeting of the CT Christmas Tree Growers’ Association, Berlin (50 attendees) *June 6*
- Presented the talk “Hemlock woolly adelgid and its management” at Valent Corporation’s Biennial Ornamentals Workshop, Moran, WY (20 attendees) *June 26*

DINGMAN, DOUGLAS

- Was interviewed live on WICC Radio (Farmington) about contamination of fresh produce (spinach and lettuce) *September 20, 2006*
- Was interviewed about *E. coli* contamination of produce by Judy Benson of The New London Day *September 20*
- Was an Outreach Participant in the CAES Science Booth at the CPTV Science Expo 2007 in Hartford *April 27, 2007*
- Participated on a Science Review Panel for the CT High School Innovation EXPO 07 *May 12*

DOUGLAS, SHARON

- Gave a presentation to visiting high school biology teachers about plant pathology and how to integrate principles of plant pathology into the high school science curriculum (25 attendees) *July 6, 2006*
- Gave a presentation on “Current diseases of concern” for the Connecticut Christmas Tree Growers at their Twilight Meeting at the Valley Laboratory in Windsor (65 attendees) *July 11*
- Was interviewed about the impact of wet weather on plant diseases in Connecticut by Lauresha Xhihani of the Republican-American *July 13*
- Organized a workshop for CGGA/CNLA titled “Getting to the Root of the Matter” and gave a presentation on “Healthy roots: Why are they important?” in Jones Auditorium (50 adult attendees) *July 20*
- Was interviewed about the impact of wet weather on crops in Connecticut by Rick Guiness of the Journal Inquirer *July 21*
- Was a guest on “Garden Talk with Len and Lisa” on WTIC NewsTalk 1080 Radio and discussed Plant Science Day and other items of interest *July 22*
- Was interviewed about indoor mold problems by WTNH Channel 8 TV *July 24*
- Assisted with a tour of the new Molecular Plant Diagnostics Laboratory for attendees of the Forest Health Program Review Panel *August 8*
- Was interviewed about poisonous plants by Chris Weatherbee for an article that she is writing for The American Gardener. Ms. Weatherbee also requested the use of Dr. Douglas’s fact sheet on poisonous plants in her article *August 15*
- Was interviewed about the parasitic seed plant dodder by Judy Benson of The Day (New London) *August 18*
- Was interviewed about diseases of maples this season by Dick Cummings of the Connecticut Post *August 28*
- Was interviewed about the Plant Disease Information Office and how it assists residents of Connecticut by Alison Damast of the Stamford Advocate *August 29*

- Was interviewed about fall color in Connecticut by Bridgette Ruthman of the Waterbury Republican-American *August 31*
- Was interviewed about Dutch elm disease and its impact on elms in Connecticut for the Greenwich Time *September 1*
- Assisted the Connecticut Tree Protection Examining Board (CTPX) with the oral exams for arborists at the Station *September 13*
- Gave a presentation on current disease problems in the Connecticut landscape, and answered questions on diseases at the Nursery Tour at the Valley Laboratory in Windsor *September 19*
- Was interviewed about anthracnose and foliar diseases of maple and the potential impact on fall color by Steve Grant of the Hartford Courant *September 20*
- Was interviewed about what is wrong with the maples and the potential impact on fall color by Judy Benson of The Day (New London) *September 20*
- Was interviewed about what is wrong with the maples by Liz Ellis of the Shoreline Times *September 21*
- Was interviewed about what is affecting maples in Connecticut by Bridgette Ruthman of the Waterbury Republican-American *September 21*
- Participated in a training session at Cornell University for use of the Plant Disease Information System (PDIS) database needed for participating members of the National Plant Disease Network (NPDN) *October 4-6*
- Was interviewed about maple diseases occurring this year by Bob Miller of the Danbury News Times *October 12*
- Was interviewed about the impact of frost on fall color by Kenton Robinson of The New London Day *October 13*
- Was interviewed about fall color by Liz Ellis of the Shoreline Times *October 23*
- Spoke with teachers from Lyman Hall High School on the role of the Plant Disease Information Office and methods to add plant pathology to the high school science curriculum (6 adult attendees) *November 6*
- Gave a presentation entitled “Introduction to Plant Pathology” to a Botany class from Quinnipiac University in Jenkins (12 adult attendees) *November 13*
- Gave a presentation entitled “Environmentally Friendly Methods for Managing Plant Diseases” to the Garden Club of Madison (65 adult attendees) *November 14*
- Discussed plant pathology and the role of the Plant Disease Information Office with sixth-graders from Spring Glen Elementary School (40 adult attendees) *November 29*
- Gave the talk “Top Diseases of 2006” at the Annual Meeting of the Connecticut Pomological Society” held in Glastonbury (85 adult attendees) *December 5*
- Assisted the Connecticut Tree Protective Examining Board with the oral exam for arborists at the Station *December 13*
- Gave the talk “Common Diseases of Juniper and Rose” at the Connecticut NOFA Organic Land Care Update Seminar in Tolland (120 adult attendees) *December 14*
- Was interviewed about the impact of the unseasonably warm temperatures on trees by Steve Grant of the Hartford Courant *January 2, 2007*
- Was interviewed about the warm weather and plants in flower by Gina DeNatale of WTNH TV *January 4*

- Was interviewed live about the impact of warm weather on plants and what to expect next spring by Dianne Smith of the WTIC morning show *January 4*
- Was interviewed about the unseasonable weather and crops in Connecticut by Ralph Hohman of the Meriden Record-Journal *January 8*
- Was interviewed about weather, plants in flower, and what to expect in the spring by Bob Miller of the Danbury News-Times *January 8*
- Gave a talk entitled "Recognition of Common Diseases of Perennials in the Landscape" to the Milford Garden Club in Milford (35 adult attendees) *January 9*
- Was interviewed about the unseasonable weather and the Experiment Station by Freda Moon of the New Haven Advocate *January 10*
- Was interviewed about the quirky weather by Shaun Moriarty of the Woodstock Villager Newspaper *January 17*
- Gave two presentations entitled "How to Kill a Tree in 10 Easy Steps" and "Noteworthy Diseases of 2006" at the Annual Winter Meeting of the Connecticut Tree Protective Association at the Aqua Turf Club in Plantsville (810 adult attendees) *January 18*
- Organized and participated in the Experiment Station booth at the Annual Winter Meeting of the Connecticut Tree Protective Association at the Aqua Turf Club in Plantsville. Participants of the CAES booth were Rose Hiskes, Thomas Rathier, Dr. James LaMondia, Tia Mastrone, and Dr. Sharon Douglas (700 adult attendees visited the booth) *January 18*
- Gave a talk entitled "Noteworthy Grape Diseases of 2006" and answered questions about grape diseases at the Grape Management Resources Meeting at the Valley Laboratory in Windsor (45 adult attendees) *January 23*
- Met with Dr. Kitty Cardwell, CSREES and National Program Leader, Plant Pathology, past Director of NPDN, to discuss the Plant Disease Information Laboratory and CAES participation in the NPDN *January 24*
- Participated in the 1st National Meeting of the National Plant Diagnostic Network (NPDN) in Orlando, FL (250 adult attendees) *January 28-February 1*
- Gave a lecture on "Understanding Plant Diseases" as part of the NOFA Organic Land Care Certification Course (60 adult attendees) *February 5*
- Participated in an exercise sponsored by the Northeast Plant Diagnostic Network (NEPDN) about an infestation by the emerald ash borer; conference calls *February 7, 26*
- Gave a presentation entitled "General care and common problems of houseplants" for the West Hartford Garden Club (75 adult attendees) *February 8*
- Was interviewed about southern blight of hostas by Pamela Weil of The Connecticut Gardener Newsletter *February 9*
- Was interviewed about the impact of no snow and quirky weather on agriculture and plants in Connecticut by Bridgette Ruthman of the Waterbury Republican-American *February 20*
- Participated in a conference call with members of NEPDN about lab accreditation and strategies for the future *February 21*
- Gave a seminar on "The Home Orchard" at the Connecticut Flower Show at the Convention Center in Hartford (35 adult and 2 youth attendees) *February 23*

- Was interviewed about ash decline and street trees in Greenwich by the Greenwich Time *February 26*
- Was an invited speaker at the UCONN Perennial Plant Conference in Storrs and gave a presentation entitled "Managing diseases of perennials in the landscape" (425 adult attendees) *March 8*
- Gave a talk entitled "Pruning: An introduction to why, how, and when" and answered questions about plant health problems for the Guilford Garden Club in Guilford (62 adult attendees) *March 14*
- Participated in a conference call debriefing for an exercise on emerald ash borer conducted by the Northeast Plant Diagnostic Network *March 22*
- Gave a presentation on "Poisonous plants" and discussed ways to prevent plant poisonings of children at the Madison Learning Center in Madison (25 adult attendees) *March 27*
- Participated in a conference call to initiate an exercise on *Phytophthora ramorum* conducted by the Northeast Plant Diagnostic Network *March 29*
- Participated in an exercise and debriefing conference call to discuss Ramorum Blight organized by the NEPDN *April 3-25*
- Participated in a conference call to discuss issues of concern for the Northeast Plant Diagnostic Network (NEPDN) *April 18*
- Organized a display on winter injury of broadleaved and needled evergreens and answered questions about plant health at Plant Science in the Spring *April 19*
- Met with Girl Scouts that were touring the Station and discussed plant pathology and the importance of disease diagnosis (10 youths and 2 adults) *April 20*
- Discussed work in the Department of Plant Pathology and Ecology, research and outreach programs and the provisionally approved laboratory for *P. ramorum* testing with Dr. Daniel Rossi, Executive Director of the Northeastern Regional Association of Agricultural Experiment Station Directors *May 7*
- Talked about the artillery fungus, *Sphaerobolus stellatus*, and strategies for remediation, with the Board of Regency Meadows of Trumbull (8 adult attendees) *May 23*

EITZER, BRIAN

- Presented a talk entitled "Linearity and Sensitivity of the QuEChERS Method for Pesticide Residues in Foods with a Labeled Internal Standard and a Linear Ion Trap LC/MS" at the 43rd Florida Pesticide Residue Workshop in Orlando, FL *July 16-19, 2006*
- Participated in a meeting of the New Haven Section of the American Chemical Society, Wallingford *October 5*
- Participated in a meeting of the Thermo Liquid Chromatography/Mass Spectrometry Users meeting in New Haven *October 10*
- Presented a poster entitled "What Chiral Pollutants May Be Trying to Tell Us About Mechanisms of Phytoextraction" at the Fourth Annual Symposium in Plant Biology at the University of Massachusetts, Amherst *October 14*
- Participated in the 27th Annual Meeting of the Society of Environmental Toxicology and Chemistry held in Montreal, Canada *November 5-8*

- Participated in a tour of the mobile counter-terrorism laboratory designed and operated by Hamilton Sundstrand at their Windsor Locks facility *November 17*
- Gave a seminar on the analysis of pesticide residues by HPLC/MS at Albertus Magnus College *December 1*
- Presented the talk "Observations on the Application of Method T022" at the Food Emergency Response Network's Cooperative Agreement Programs LC/MS and GC/MS Conference in Phoenix, AZ *January 23-25, 2007*

ELMER, WADE H.

- Was interviewed about the association between *Fusarium* species and the Sudden Wetland Dieback phenomenon observed in Long Island Sound and Cape Cod by Carolyn Johnson of the Boston Globe *July 12, 2006*
- Was interviewed about the connection between *Fusarium* species and Sudden Wetland Dieback by Ashley Ahearn for National Public Radio's Living on Earth" *July 18*
- Moderated the morning session of a joint meeting between the Experiment Station and UCONN Cooperative Extension titled "Getting to the Root of the Matter" and presented a demonstration on biological fungicides with seedling geraniums in Jones Auditorium (50 attendees) *July 20*
- Was interviewed about the association of Fusarium species with Sudden Wetland Dieback by Ashley Ahearn for National Public Radio's "Living on Earth" at the Yale Media Production Studio in New Haven *July 25*
- Presented the poster "Distribution of *Fusarium* species on corn stubble in Connecticut" and made a presentation at the Division Officer's luncheon at the annual meeting of The American Phytopathological Society in Quebec, Ontario, Canada *July 29-August 1*
- Was interviewed about the *Fusarium* species associated with Sudden Wetland Dieback by Ashley Ahearn of National Pubic Radio's "Living on Earth" *August 3*
- Discussed agricultural issues at a meeting/presentation with Congresswoman Rosa DeLauro at Geremia Farms in Wallingford *August 3*
- Was interviewed about the association of *Fusarium* with Sudden Wetland Dieback in New England by Ray Henry of the Associated Press *August 10*
- Was interviewed about the association of *Fusarium* with Sudden Wetland Dieback in New England by Nancy Cohen of Connecticut Public Radio *August 11*
- Along with Dr. James LaMondia and Ms. Joan Bravo, met with Ashley Ahearn of National Public Radio at Hammonasset Beach State Park to view and report on a site where Sudden Wetland Dieback has occurred *August 16*
- Was interviewed about the association of *Fusarium* with Sudden Wetland Dieback in New England by Jim Shelton of the New Haven Register *August 16*
- Was interviewed about the association of Fusarium spp. with sudden wetland dieback in New England by Nancy Cohen of Connecticut Public Radio *September 12*
- Presented a lecture on "Plant parts and their diseases" to the first- and second-grade classes at Mile Creek Elementary School in Old Lyme (82 attendees) *September 26*
- Moderated a short course on "Poinsettia Diseases" in Jones Auditorium (15 attendees) *September 28*

- Presented a series of laboratory lectures on "Using Vegetative Compatibility Groups in *Fusarium*" at the University of Florida in Gainesville, FL (12 attendees) *October 7-10*
- Was interviewed about sudden wetland dieback on Orient Point, Long Island, NY by Rebecca Packard of the Suffolk News *October 24*
- Presented the poster "*Fusarium* species associated with declining Spartina in areas affected by sudden wetland dieback" at the New England Estuarine Research Society meeting in New London, CT (100 attendees) *October 26-28*
- Presented the paper "*Fusarium* Species Associated with Declining *Spartina* in Areas Affected by Sudden Wetland Dieback" and attended the Extension/Industry meeting and officiated at the NED-APS business meeting and banquet as Division President at the Annual Meeting of the Northeastern Division of The American Phytopathological Society in Burlington, VT (55 attendees) *November 7-9*
- Presented a lecture on "*Fusarium* species, pathogens, and problems" to a Botany class from Quinnipiac University in the Jenkins Building (12 attendees) *November 13*
- Participated in a meeting of the Proposal Planning Committee for Sudden Wetland dieback at the UMASS Cranberry Research Center in Wareham, MA (8 attendees) *November 17*
- Was interviewed about the role of fungal pathogens in marsh dieback in Connecticut by Leah Stetson for the newsletter of the Association of State Wetland Managers, Inc. *December 1*
- Participated in the Connecticut Greenhouse Growers' Association Winter Meeting at the Mountainside Conference Center in Wallingford *January 3, 2007*
- Gave four presentations "Biological Products for Nursery Crop Control" (45 attendees) "Biological Products for Greenhouse Crop Control" (42 attendees), "Root Rot Diseases of Nursery Crops" (45 attendees), and "Root Rot Diseases of Greenhouse Crops" (42 attendees) at the Long Island Agricultural Forum Meeting in Riverhead, NY *January 18-19*
- Moderated the meeting and presented a talk entitled "Diagnosing, Preventing, and Managing Bedding Plant Diseases" at the UCONN-CAES Bedding Plant Meeting in Jones Auditorium (37 attendees) *January 23*
- Gave a presentation entitled "Diagnosing, preventing, and managing bedding plant diseases" at the Bedding Plant Meeting in Tolland (28 adult attendees) *February 1*
- Sponsored David Rochford, a student at Cheshire High School, for a half day of career shadowing *February 2*
- Presented an invited seminar entitled "The possible role of plant pathogens in sudden wetland dieback" at the University of Massachusetts in Amherst, MA (17 adults attended) *February 20*
- Presented a talk entitled "Diagnosing, preventing, and managing bedding plant diseases" at the Bedding Plant Meeting in Torrington (24 adult attendees) *February 27*
- Gave a talk entitled "Vegetables, nutrition, and disease management" sponsored by Crop Production Services, Inc., at the Vegetable Growers Meeting in Middletown (43 adult and one child attendees) *March 8*

- Gave a presentation entitled “Abiotic and biotic stress that affect sudden wetland dieback” (19 adult attendees) and presented a poster entitled “Possible role of Fusarium species in sudden wetland dieback” at the First Connecticut Conference on Natural Resources in Storrs (28 adults and 2 children attended) *March 9*
- Presented the workshop “Earthworms and soil health” at the NOFA Conference on “Cultivating Connecticut” in Windsor (11 adult attendees) *March 10*
- Gave a presentation entitled “Role of plant pathogens in sudden wetland dieback” to executive officers from Sikorsky Aircraft in Johnson-Horsfall (2 adult attendees) *March 14*
- Was interviewed about salt marshes by 4th and 5th grade students at Cold Spring School in Fair Haven (15 children, 2 adult attendees) *March 29*
- Participated in a Connecticut Greenhouse Growers Association planning meeting at Michaels Greenhouse in Cheshire *April 10*
- Spoke on “The role of plant pathogens in Sudden Wetland Dieback at the Station Board of Control Meeting *April 12*
- Participated in the planning meeting for the Northeastern Division of The American Phytopathological Society *April 27*
- Presented the paper “Pathogenicity of *Fusarium* species to *Spartina alterniflora*” at the New England Estuarine Research Society in Booth Bay Harbor, Maine (45 attendees) *May 3-5*
- Gave the presentation “Plant parts and their diseases” to four classes at Doolittle School and to eight classes at Highland School in Cheshire (240 student and 18 adult attendees) *May 21*
- Presented an update on pathogenic species of *Fusarium* on *Spartina alterniflora* at the Third Workshop on Sudden Wetland Dieback held at the Audubon Society Building in Wellfleet, MA (42 adult attendees) *May 22-23*
- Gave a brief report on the role of *Fusarium* in Sudden Wetland Dieback at the CT DEP press conference held at Hammonasset State Park in Madison (15 attendees) *May 25*
- Was interviewed about Sudden wetland dieback by a reporter from Quinnipiac’s WQUN Radio *May 25*
- Served as leader of the Plant Pathogens team for the 2007 BioBlitz held in Middletown. He found 46 plant pathogens. (150 adult and 150 youth attendees) *June 8-9*
- Was interviewed about salt marsh dieback by Jim Frasier of the Cape Cod Times *June 12*
- Was interviewed about salt marsh dieback by Dave Funkhouser of the Hartford Courant *June 14*
- Discussed salt marsh dieback with Dave Funkhouser of the Hartford Courant at the Banca Marsh in Branford *June 20*
- Discussed pathogens other than *Fusarium* associated with dying *Spartina* plants on Cape Cod with Dr. Frank Caruso of the University of Massachusetts *June 28*

FERRANDINO, FRANCIS

- Presented a talk entitled "Crop Growth, Ontogenic Resistance and Disease Progress: A Discussion with Examples" at the Annual Meeting of the Northeastern Division of The American Phytopathological Society (NED-APS) in Burlington, VT (55 attendees) *November 7-9, 2006*
- Gave the talk "How Does Plant Growth Affect Epidemics?" to a Botany class from Quinnipiac University in Jenkins (12 attendees) *November 13*
- Gave two talks entitled "Milk: An environmentally friendly control for powdery mildew on cucurbits" and "Culture of eggplants in Connecticut" to the Heritage Village Garden Club in Southbury (54 attendees) *April 18, 2007*

FOLEY, TESS

- Established Grants and Contracts office in *January 2007*.
- Distributed corporate announcement mailing to 300+ corporate contacts *January 2007*
- Attended UConn Biofuels Conference *January 11*
- Published Farmland Preservation Letter to Editor in Monroe Courier *February 1*
- Hosted presentation funding meeting with Sikorsky Aircraft Corporation executives *March 14*
- Attended Hartford, CT Agriculture Day at the Capital *March 21*
- Participated in Farmland Preservation meeting with local farmers, concerned citizens and interested local businesses in Monroe, CT *March 9*
- Hosted a presentation meeting for executives from Sikorsky Aircraft Corporation. An overview and history of the research work of The Station were presented. *March 14*
- Participated with Station scientists representing West Nile Virus, Lyme Disease, Forestry, Phytoremediation, Biofuels, and Sudden Wetland Dieback in Sikorsky Aircraft Corporation Earth Day Celebration *April 19*
- Discussed Station research into pollinator and honey bee decline with Dr. Elizabeth Pivonka, President and CEO of the Produce for Better Health Foundation *April 20*
- Ongoing promotion of CAES Environmental Research Areas to corporations interested in supporting environmental issues of concern *January – December. 2007*
- Attended Advertising Age's "Eco-Marketing Conference" in New York City *June 12*
- Interviewed by Connecticut Post on farmland preservation, zoning regulations, and tax relief for Connecticut farmers *June 18*
- Published BrandWeek Letter to the Editor on corporate funding of environmental issues *July 2*
- Provided tour guide services to summer students from Yale University and Southern Connecticut State University touring the Station *July 13*
- Coordinated writing, management, and submission of 43 grants proposals seeking funding for various Station research *January – June 2007*

GENT, MARTIN P. N.

- Gave the talk "Extending the vegetable season" to the East Haven Garden Club (8 attendees) *August 17, 2006*
- Delivered an invited talk "Factors affecting starch mobilization in greenhouse vegetables" at the Canadian Greenhouse Conference in Toronto, Canada (100 growers, 20 scientists and extension agents) *October 4-5*
- Presented a talk on "Modeling the effect of nutrient solution composition and irradiance on a ccumulation of nitrate in hydroponic lettuce" at Hortimodel 2006, a symposium sponsored by the International Society of Horticultural Science in Wageningen, Netherlands (150 attendees) *October 29-November 2*
- Visited "Two Guys from Woodbridge" a Hydroponic Lettuce Production operation in Hamden and discussed production of lettuce and salad greens *November 15*
- Participated in the Organizing Committee meeting of the New England Vegetable and Fruit Growers Conference in Manchester, NH (20 attendees) *December 21*
- Presented the poster "Effect of Degree and Duration of Shade on Quality of Greenhouse Tomato" at the Northeast Region American Society of Horticultural Science Meeting in College Park, MD *January 4-5, 2007*
- Served on a panel of judges of graduate student presentations at the Northeast Region American Society of Horticultural Science Meeting in College Park, MD (30 attendees) *January 4-5*
- Participated in a planning meeting of the New England Vegetable and Fruit Growers Conference in Manchester, NH (20 attendees) *January 22*
- Met with officials of Marrakech, Inc., a job development and employment service, to visit greenhouses at Lockwood Farm and offices at the Experiment Station to learn about hydroponics and growing plants from seed *March 7, 15, and 21*
- Presented a poster "A Dynamic Model of Water Potential and Movement in Whole Plants Based on Compartment Volumes and Water Contents" at the Biological Systems Simulation Group Conference in Beltsville, MD (60 attendees) *April 17-19*
- Visited Marrakech, Inc., a job development and employment service in New Haven, to talk about conditions for growing vegetable plants (15 attendees) *April 26*
- Hosted an open house to demonstrate the new Ebb and Flood Watering Greenhouse, constructed by Geremia Greenhouse at Lockwood Farm *May 8*
- Participated in the NE-1017 Regional Research Committee Meeting on Developing and Integrating Components for Commercial Greenhouse Production Systems held in Reading, PA (20 scientists) *June 7*

HISKES, ROSE

- Taught a class on butterfly gardening to Advanced Master Gardeners in Storrs (9 attendees) *July 15, 2006*
- Was interviewed about the results of an aerial survey for Gypsy moths by Sam Gingarella of WTIC Radio *July 19*
- Staffed the Station's Question and Answer Booth at the Connecticut Tree Protective Association's summer meeting in Farmington *July 20*
- Was interviewed about cicadas for the Danbury News Times *August 7*

- Participated in the Connecticut Invasive Plant Working Group Symposium Planning Committee in Wallingford *August 9*
- Participated in a Green School Planning Meeting via conference call *August 11*
- Participated in a Connecticut Nursery and Landscape Education Committee Meeting in Cromwell *August 15*
- Participated in the Connecticut Invasive Plant Working Group Symposium Planning Committee in Windsor *September 7*
- Participated in a Connecticut Tree Protective Association Education Committee Meeting in New Haven *September 6*
- Taught cub scout pack 389 about trees, wildlife, and insects (9 attendees) *September 7 & 29*
- Gave a talk on invasive plants to the Ledyard Garden Club in Ledyard (40 attendees) *September 11*
- Was interviewed about insects that enter homes in the fall by Harlan Levy of the Journal Inquirer (50,000 circulation) *September 18*
- Taught a Plant ID Clinic to students in the Connecticut Accredited Nursery Professional Course in Windsor (12 attendees) *September 23*
- Helped staff the Station booth at the Big E in Springfield, MA *September 27*
- Taught a course on Ornamental Grasses for the Connecticut Landscape for Windsor Adult Education in Windsor (6 attendees) *September 30*
- Gave a talk on houseplants to the Olde Ripton Garden Club in Seymour (20 attendees) *October 2*
- Participated in a Connecticut Tree Protective Association Education Committee meeting in Windsor *October 25*
- Gave a talk on "Pests of the Garden" to the Windsor Garden Club in Windsor (20 attendees) *November 13*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor *November 20*
- Participated in a Connecticut Tree Protective Association workshop planning committee in New Haven *November 21*
- Along with Dr. Todd Mervosh gave a talk on "Invasive Plants" to sixth year certificate education students at Southern Connecticut State University in New Haven (23 teacher and 100 student attendees) *November 30*
- Was interviewed about weather and insects by Bob Miller of the Danbury News-Times *January 8, 2007*
- Staffed the CAES booth at the winter meeting of the Connecticut Tree Protective Association in Southington *January 18*
- Gave a talk on "Insects" to the YWCA after school program at Annie Fisher School in Hartford (30 attendees) *January 19*
- Participated in a Connecticut Invasive Plant Working Group Steering Committee Meeting in Windsor *January 30*
- Gave a talk on "Carefree Landscape Plants" to Springfield College's Facilities Management majors in Windsor (60 attendees) *March 6*
- Gave a talk on "Flying Flowers" to the Vernon Garden Club in Vernon (40 attendees) *March 19*

- Gave a talk produced by Mr. Kenneth Welch on "Bedbugs: A Growing Problem" to Connecticut Association of Housing Code Enforcement Officers in New Haven (80 attendees) *March 30*
- Identified invasive species at the Quaker Meetinghouse in New Haven *April 4*
- Gave a talk on "A Cutting Garden" to the Bethany Garden Club in Bethany (30 attendees) *April 9*
- Staffed an insect display at the Imagine Nation Museum in Bristol (40 attendees) *April 13*
- Gave a talk on "Invasive Plants" to the Connecticut Gladiolus Society (10 attendees) *April 14*
- Staffed a tick display at the Peabody Museum in New Haven (2,000 attendees) *April 19*
- Staffed the Station booth at the Connecticut Science Exposition in Hartford *April 27*
- With Thomas Rathier gave a talk on "Integrated Pest Management" at Farm-City in Shelton (700 students from Bridgeport, Stratford, and Torrington) *May 15-17*
- Gave a talk on "Plants Out of Place" to the Naugatuck Valley Audubon Society (20 attendees) *May 15*
- Talked about being entomologists to Boy Scout Pack 25 *May 31*

IANNUCI-BERGER, WILLIAM
- Presented a poster entitled "What Chiral Pollutants May Be Trying to Tell Us About Mechanisms of Phytoextraction" at the Fourth Annual Symposium in Plant Biology at the University of Massachusetts, Amherst *October 14, 2006*
- Participated in a tour of the mobile counter-terrorism laboratory designed and operated by Hamilton Sundstrand at their Windsor Locks facility *November 17, 2006*

INMAN, MARY K.
- Gave a talk entitled "Basic techniques for propagating plants" to the East Haven Garden Club at the Beach House in East Haven (12 attendees) *July 20, 2006*
- Participated in a training session at Cornell University for use of the Plant Disease Information System (PDIS) database needed for participating members of the National Plant Disease Network (NPDN) *October 4-6*
- Answered questions from employees about plant problems at the CAES booth set up for the Earth Day Celebration at Bristol-Myers Squibb in Wallingford (100 attendees) *April 20, 2007*

KETTLE, IRA
- Presented a display of honey bees and distributed Station literature for "Family Day" at the Harkness State Park (1,159 attendees) *September 10, 2006*
- Helped staff the Station booth at the Big E in Springfield, MA (80,000 head count to the event) *September 27, 28*
- Gave a live Honey Bee Demo to the 2nd grade class at the Catherine Maturo Savin Rock Community School in West Haven (23 attendees) *October 6*
- Showed honey bees, passed out honey bee fact sheets to adults and older children and honey bee cartoon coloring sheets to younger children; and passed out Station

information on services to Connecticut citizens and spoke on the importance of pollination at the Fall Festival at Brooksvale Park in Hamden (2,500 attendees) *October 21*
- Had one on one talks with beekeepers at the Connecticut Beekeepers Association Meeting (65 attendees) *October 31*
- Spoke on inspections and registrations to members of the Connecticut Beekeepers Association (38 attendees) *February 10, 2007*
- Manned the Station's exhibit at the 26th Annual Flower and Garden Show at the Connecticut Convention Center, Hartford (30,000 head count to the event) *February 22-25*
- Gave a bee presentation to the Duck River Garden Club of Lyme & East Lyme (55 attendees) *March 12*
- Set up and helped with an exhibit at the annual Garden Expo in Fairfield (3,000 attendees) *March 17-18*
- Gave a bee presentation to a 3rd grade class at Lake Street School in Vernon (25 attendees) *April 9*
- Gave a bee presentation to the Norwalk Garden Club in Norwalk (27 attendees) *April 11*
- Staffed an exhibit on honey bees and biodiesel at the CPTV Family Science Expo in Hartford (13,500 head count at the event) *April 26-28*
- Provided a honey bee educational demonstration at CRT Early Care & Education Center (Community Renewal Team, Inc.) in Hartford (48 students and 11 adults) *May 9*
- Provided a honey bee educational demonstration at Locust Street Headstart in Hartford (50 students and 9 adults) *May 15*
- Spoke on the importance of registering bee hives at the Eastern Connecticut Beekeepers Association Twilight Meeting at Richard Norman's in Woodstock (60 attendees) *May 17*
- Provided a bee presentation and talk for two science classes at Stonington High School in Pawcatuck (32 attendees) *May 25*
- Gave a bee demonstraton and talked about bees to students from the Ridge Road School (kindergarten – 3rd grade) and handed out age appropriate materials (51 attendees) *June 14*
- Gave an educational presentation on the honey bee for the Ridge Road School at Lockwood Farm. A question and answer period followed (51 attendees) *June 14*

KROL, WALTER
- Presented a talk entitled "From Flora to Fern: The Role Played by the Connecticut Agricultural Experiment Station" at the 43rd Annual Florida Pesticide Residue Workshop and 8th Annual Food-borne Pathogen Analysis Conference held at the Hilton in the Walt Disney World Resort in Orlando, Florida *July 16-19, 2006*
- Presented a demonstration entitled "Conversion of Oil seed to Biodiesel" at The Connecticut Building at The Big E, West Springfield, MA *September 27-28*

- Presented a poster entitled “Oilseed Crops for Biodiesel and Conversion of Oilseed to Biodiesel” at the Biodiesel Symposium sponsored by the University of Connecticut *January 11, 2007*
- Presented the talk “Characterization of Connecticut Grown Wines – Analytical Capabilities at CAES” at the Grape Management Resources Meeting held at the Valley Laboratory in Windsor *January 23*
- Presented a talk entitled “The role of biodiesel in Connecticut” to the New Haven Section of The American Chemical Society at its March meeting held in Derby *March 15*
- Presented a talk entitled “The Role of biodiesel in Connecticut: A Solution to our Energy Shortcomings?” to The Agricultural Experiment Station Associates at their Annual Meeting in Jones Auditorium *March 22*
- Presented a biodiesel poster display at Ag Day at the Capitol 2007 *March 21*
- Was interviewed about biofuels by Steve Slossberg of The Day *April 2*
- Was interviewed about biofuels by Paul Gough for the Bulletin of The Connecticut Academy of Science and Engineering *April 5*
- Presented a talk entitled “Biodiesel Fuel from Connecticut Oilseed” at the Spring 2007 Open House in Jones Auditorium *April 19*
- Presented an exhibit entitled “Oilseed Crops for Biodiesel” at the CPTV Family Science Expo, Expo Center, Hartford *April 26-28*
- Served as the Chairman for the American Chemistry Society National Chemistry Week Essay Contest. This involved designing experiments and judging essays based on experiments submitted by grammar through high school students throughout New Haven County. Ten student prizes were awarded. *June 6*

LAMONDIA, JAMES A.

- Was interviewed about biodiesel research by Paul Gough for the Experiment Station Associates Bulletin *July 6, 2006*
- Answered arborists’ inquiries while working at the CAES booth during the CTPA Summer Meeting in Farmington *July 20*
- Gave a talk about Station research and led a tour of Valley Laboratory farm plots for students from the Great Mountain Forest Yale Ecology Camp *July 26*
- Was interviewed about the use of oilseed crops for biodiesel by Ann DeMatteo for the New Haven Register *August 2*
- Participated in the Connecticut Agricultural Information Council Meeting in Tolland *August 15*
- Was interviewed about root-knot nematodes infecting *Spartina* salt marsh grasses by Ashley Ahearn of National Public Radio’s “Living on Earth” program *August 16*
- Met with researchers at the University of Connecticut Chemistry and Engineering Departments to discuss research on biodiesel production in Connecticut *August 23*
- Participated in the Office of Policy and Management Bio-energy Research Center meeting *August 31*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *September 13*

- Participated in the Pilot Project Symposium for the Harvard-NIOSH ERC Occupational Health Program at the Harvard School of Public Health in Boston *September 15*
- Welcomed participants and spoke about rotation crops for nematode management as a part of the Valley Lab Nursery and Landscape Research Tour *September 19*
- Discussed research proposals at a meeting of the UCONN Biofuels Consortium in Storrs *September 27*
- Spoke about oilseed crop production for biodiesel at the Station Booth at the Big E *September 28*
- Contributed a poster on Oilseed crop research as a part of the biofuels presentation held at the Cornucopia Fest at the University of Connecticut *October 8*
- Participated in the meeting of the Connecticut Agricultural Information Council in Tolland *October 13*
- Presented a research report on bioenergy and IPM to the Station Board of Control in Windsor *October 18*
- Spoke about research results at the annual meeting of the Northeast Regional Nematology Technical Committee (NE-1019) held in Gainesville, FL (14 attendees) *October 26-27*
- Taught a session on tree diseases as a part of Arboriculture 101 in New Haven (40 attendees) *November 1*
- Participated in a planning meeting about biofuel held at the Office of Policy and Management in Hartford *November 3*
- Attended the Northeast Division Meeting of the American Phytopathological Society to present "Characteristics of *Meloidogyne spartinae* infection of the salt marsh grass *Spartina alterniflora*" (50 attendees) and acted as secretary of the extension-industry meeting in Burlington, VT *November 7-9*
- Presented root-knot nematode results during a meeting about salt marsh dieback held in East Wareham, MA *November 17*
- Participated in the Pandemic Continuity of Operations COOP Interagency Training Session held at Manchester Community College *December 13*
- Spoke about "Sudden Wetlands Dieback – Possible Role of Root-Knot Nematodes" at a Lunch Club in Jones Auditorium *December 14*
- Participated in the Pandemic Continuity of Operations COOP Interagency Training Session held at Manchester Community College *January 8, 2007*
- Spoke about "Biofuel Crops and Integrated Pest Management" at the Biofuels Symposium –Policy, Opportunity and Science, held at UCONN in Storrs (50 attendees) *January 11*
- Spoke to the Station's Board of Control about Integrated Pest Management with Biofuels Oilseed Crops in Hartford *January 16*
- Spoke about "Management of Nematodes and Fungal Diseases of Grapes" at a Grape Growers' Meeting held at the Valley Laboratory (45 attendees) *January 23*
- Participated in a UConn-CAES Biofuels Research Planning Meeting held in New Haven *February 1*
- Participated in a meeting of the UConn Biofuels Consortium held in Storrs *February 2*

- Participated in a committee meeting about developing a CAES Educational Web Site for Teachers and Students in New Haven *February 5*
- Was interviewed about plans for the proposal "Training for Ag Service Providers in the Diagnosis, Visual Assessment, and Management of Plant-Parasitic Nematodes" by the NE-SAE Professional Development Grants Panel in Manchester, NH *February 7*
- Presented a seminar with Wade Elmer on the "Potential Role of Pathogens in Sudden Marsh Decline" to the Department of Plant and Soil Science at the University of Massachusetts (30 attendees) *February 20*
- Spoke about research on management of tobacco pathogens including blue mold and tobacco mosaic virus and breeding for multiple pathogen resistance at the Tobacco Research Meeting held in Suffield (145 attendees) *February 21*
- Participated in a second UCONN/CAES Biofuels Research Planning Meeting held in Storrs *February 22*
- Gave a talk on "Carefree Landscape Plants" to the Springfield College Facilities Management majors in Windsor (60 attendees) *March 6*
- Spoke about the CAES overview and plant pathology research to students in the Sports Management Graduate Program from Springfield College at the Valley Laboratory (60 attendees) *March 6*
- Presented the talk "The plant parasitic nematode *Meloidogyne spartinae* – a possible contributor to salt marsh decline" at the Connecticut Conference on Natural Resources (40 attendees) *March 9*
- Was interviewed about salt marsh decline by Judy Benson of the New London Day *March 9*
- Participated in the Connecticut Agricultural Information Council Commissioners Forum held at the CAES Valley Laboratory *March 12*
- Spoke about the Experiment Station and summer research assistant opportunities at a Career Day and Job Fair held at Central Connecticut State University (40 attendees) *March 12*
- Spoke with Sikorsky representatives about Eco-sensitive research projects on wetlands dieback and the development of biofuel feedstocks *March 14*
- Taught a session on tree diseases as a part of Arboriculture 101 in New Haven (40 students) *March 14*
- Participated in Ag Day at the Capitol by manning the Station Booth and setting up a poster display on Biodiesel *March 21*
- Spoke to the Experiment Station Associates about production and integrated pest management aspects of oilseed crops for biodiesel and their annual meeting in New Haven *March 22*
- Spoke about breeding shade and broadleaf tobacco for multiple pathogen resistance at the CPS Tobacco Growers Meeting held in East Windsor (150 attendees) *April 4*
- Participated in a Connecticut Valley Tobacco Growers meeting to address issues affecting crop production held at Suffield High School *April 5*
- Hosted and participated in a planning meeting of Connecticut and Massachusetts tobacco growers at the Valley Laboratory to create the ConnMass Tobacco Growers Association and address issues affecting crop production *April 9*

- Presented posters on “Oilseed Crops and Biofuels” and “Sudden Marsh Dieback” for Earth Day held at Sikorsky in Stratford *April 19*
- Spoke about “Biofuel Crops and Integrated Pest Management” and spoke to tour groups about the role of plant pathogens in sudden wetland dieback as a part of the CAES Plant Science Day in the Spring Open House *April 19*
- Was interviewed about biofuels for the New Haven Register *April 19*
- Hosted and participated in a meeting of the ConnMass Tobacco Growers Association at the Valley Laboratory to address issues affecting crop production *April 23*
- Participated in a planning meeting of the Executive Committee of the Northeast Division of the American Phytopathological Society in Cape May, NJ *April 26-27*
- Spoke about biodiesel production from oilseed crops as a part of the Station booth at the CPTV Family Science Expo 2007 in Hartford *April 28*
- Spoke about the pathogens which cause disease on roses to the Connecticut Rose Society at the pond house in Elizabeth Park, Hartford (55 attendees) *May 6*
- Met with Dr. Daniel Rossi, Executive Director of the Northeast Regional Association of State Agricultural Experiment Station Directors in New Haven to talk about research at the Valley Laboratory May 7
- Presented an invited talk on *Meloidogyne spartinae*, a possible cause of sudden salt marsh dieback, at the Sudden Wetland Dieback Workshop held in Wellfleet, MA (30 attendees) *May 23*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *June 12*

LI, DEWEI

- With Dr. James LaMondia, gave the presentation “A Pilot Study of Workers’ Exposure to Airborne and Phylloplane Fungi in Greenhouses in CT with a Traditional Method and QPCR” at the Pilot Project Symposium for the Harvard-NIOSH ERC, Occupational Health Program, at the Harvard School of Public Health, Harvard University (20 attendees) *September 15, 2006*
- Participated in a Board meeting of Analytic Accreditation Board (AAB) of the American Industry Hygiene Association (AIHA) in San Jose, CA *September 16*
- Gave the talk “A Pilot Study of Worker’s Exposure to Airborne and Phylloplane Fungi in Greenhouses in Connecticut with a Traditional Method and QPCR” at the Center for Indoor Environments and Health at the UConn Health Center (12 faculty, physicians, and attendees) *December 13*
- Participated in a board meeting of the Analytic Accreditation Board (AAB) of American Industry Hygiene Association (AIHA) in San Francisco, CA *February 7-11, 2007*
- Gave a talk on “Carefree Landscape Plants” to the Springfield College Facilities Management majors in Windsor (60 attendees) *March 6*
- Participated in a board meeting of the Analytic Accreditation Board of American Industry Hygiene Association in Philadelphia *June 2-3*

MAGNARELLI, LOUIS A.

- Spoke to 20 high school science teachers about Station programs *July 6*
- Was interviewed about invasive plants and insects by Melissa Nicefaro of Business New Haven *July 13*
- Was interviewed about Lockwood Farm by Betsy Driebrek of the Hamden Daily News *July 13*
- Welcomed greenhouse and nursery growers in Jones Auditorium *July 20*
- Was interviewed about Plant Science Day by Brian Smith of WICC Radio in Bridgeport *July 21*
- Was interviewed about Station research by Allison Damast of the Stamford Advocate *July 27*
- Was interviewed about Station research by Joel Lang of the Hartford Courant *July 31*
- Was interviewed about Station research programs by Ray Andrewsen of WQUN Radio in Hamden *August 1*
- Was interviewed about Station research by Jim Buchanon of WICC Radio *August 1*
- Was interviewed about Plant Science Day by Ann DeMatteo of the New Haven Register *August 2*
- Spoke to growers at a forum hosted by Congresswoman Rosa DeLauro in Wallingford *August 3*
- Was interviewed about ticks by Christiana Glavin of the New Canaan News Review *August 24*
- Was interviewed about ticks and Lyme disease by Brian Walheimer of the Norwich Bulletin *September 1*
- Was interviewed about mosquitoes by Michael Dinan of the Greenwich Times *September 5*
- Chaired the Invasive Plants Council meeting in Hartford *October 10*
- Participated in a CT Academy of Sciences and Engineering meeting in New Haven *October 18*
- Spoke about Station programs at the New Haven Farm Bureau meeting in New Haven *October 19*
- As Administrative Advisor, participated in a multi-state research meeting in Gainesville, Florida on nematode pests of plants *October 26*
- Gave a presentation on research programs at The Connecticut Agricultural Experiment Station at the International Agronomy Conference in Indianapolis, Indiana *November 13*
- As Chairman, conducted a meeting of the Legislative Invasive Plants Council in Hartford *November 21*
- Welcomed members of the Federated Garden Club Garden School to Jones Auditorium and spoke about crops/biodiesel research *November 28*
- Spoke to the Experiment Station Associates Board members about Station research *December 5*
- Was interviewed about organic farming by Cara Barruzzi of the New Haven Register *December 22*
- As Chairman, conducted a meeting of the Legislative Invasive Plants Council in Hartford *January 9, 2007*

- Was interviewed about invasive plants by Nancy Cohen of WNPR, Connecticut Public Radio *January 10*
- Welcomed the grape growers at the Valley Laboratory *January 23*
- Met with officials from the USDA/CSREES at the Station and reviewed research programs *January 24, 25*
- Met with Farm Bureau members and legislators in Jones Auditorium and spoke about research on crops/biodiesel, invasive aquatic plants, and mosquitoes/encephalitis viruses *January 25*
- Met with visitors from Texas A&M University at the Station and reviewed Station research programs on ticks, mosquitoes, invasive plants, and food safety *January 31*
- As Chairman, conducted a meeting of the Legislative Invasive Plants Council in Hartford *February 13*
- Gave a talk on Station research to tobacco growers at Suffield High School *February 21*
- Testified at an Appropriations Hearing in Hartford and reported on Station research accomplishments *February 22*
- Was interviewed about snow and the survival of plants and insects by Rebecca Ransome of the Litchfield County Times *February 27*
- Met with Experiment Station Associates in the Board Room and gave a report on research findings *March 1*
- Gave a presentation on Station research progress to a General Assembly Appropriations Sub-committee *March 2*
- Gave a presentation on Station research progress to a General Assembly Sub-Committee on Finance, Revenue, and Bonding *March 2*
- Gave a report on Station research at a forum on agriculture held at the Valley Lab *March 12*
- Was interviewed about West Nile virus and mosquitoes by Bob Miller of the Danbury News Times *March 13*
- Was interviewed about the Jenkins Building by Ken Drayeske of the New Haven Advocate *March 15*
- Was interviewed about honey bees by Joel Thompson of the CT Post *March 19*
- Welcomed 26 Station Associates to Jones Auditorium and gave a report on Station research activities *March 22*
- Welcomed 76 members of the Federated Garden Clubs of Connecticut to Jones Auditorium and gave a report on Station research *March 27*
- Was interviewed about honey bees by Brian Smith of WICC radio in Bridgeport *April 18*
- Welcomed attendees at the Station's Open House held in Jones Auditorium *April 19*
- Was interviewed abut ticks by Bett Zimmerman of the Villager Newspaper *April 23*
- Was interviewed about honey bees by Bobby Sherwood of WTIC radio *April 24*
- Was interviewed about honey bees by Abe Katz of the New Haven Register *April 27*
- Was interviewed about invasive plants by Tim Stelloh of the Stamford Advocate *May 8*
- Was interviewed about honey bees by Jared Newman of the Wilton Villager *May 29*

- Spoke to the Backyard Beekeepers Association in Weston about Station Research (53 attendees) *May 29*
- Was interviewed about mosquitoes by Nancy Cohen of Connecticut Public Radio (WNPR) *May 31*
- Chaired the Invasive Plants Council Meeting at the Valley Laboratory, Windsor *June 12*
- Met with the Connecticut Agricultural Information Council at the Valley Laboratory in Windsor to consider farms for the Century Farm Award *June 13*
- Met wit the Experiment Station Associates Board of Directors and gave a report on Station research and other activities *June 14*

MAIER, CHRIS T.

- Spoke about surveys for the emerald ash borer and the *Sirex* wood wasp at the Forest Health Review in Jones Auditorium *August 9, 2006*
- Spoke about the emerald ash borer at the Forest Health Cooperators Meeting in New Haven *September 26*
- Gave a report on surveys for exotic moths in Connecticut at the Annual New England, New York, and Canadian Fruit Pest Management Workshop in Burlington, VT *October 24-25*
- Presented a display on checkered beetles of Connecticut and introduced new entomological literature at a meeting of the Connecticut Entomological Society in Jones Auditorium *November 17*
- Presented a poster on the winter moth and exhibited a new field guide on fruit pests at the Annual Meeting of the Connecticut Pomological Society in Glastonbury *December 5*
- Displayed a poster entitled “Weekly Abundance of Wood-boring Beetles and Selected Natural Enemies (Coleoptera) Captured on Sticky Bands on Girdled Trees and in Lindgren Funnel Traps in Connecticut Forests” at the Annual Meeting of the Entomological Society of America in Indianapolis, IN *December 13*
- Spoke on “Alien Insects That Could Threaten Forest Health” and answered questions at the CAES booth during the Annual Meeting of the Connecticut Tree Protective Association in Southington (810 attendees) *January 18, 2007*
- Displayed new entomological literature at a meeting of the Connecticut Entomological Society at the University of Connecticut in Storrs (35 attendees) *January 19*
- Spoke on “Alien Insects That Could Threaten Forest Health” at the Forest Health Monitoring Workshop in Jones Auditorium (35 attendees) *February 22*
- Spoke on “Alien Insect Pests Recently Discovered in the Northeast” during a Tree and Landscape Management Seminar of Bartlett Tree Company at Naugatuck Valley Community College in Waterbury (40 attendees) *March 8*
- Spoke on “Alien Insect Pests Recently Discovered in Northeastern North America” at the Connecticut Conference on Natural Resources held at the University of Connecticut, Storrs (50 attendees) *March 9*

- Spoke about "Alien Insect Pests Recently Discovered in Northeastern North America" at a meeting of the Naugatuck Valley Audubon Society at the Kellogg Environmental Center in Derby (25 attendees) *March 20*
- Displayed fact sheets on exotic insects and other entomological literature at a meeting of the Connecticut Entomological Society at the University of Connecticut, Storrs (35 attendees) *March 23*
- Displayed entomological literature at the Annual Dinner Meeting of the Connecticut Entomological Society in Jones Auditorium *April 20*
- Spoke about the threat of exotic leafrollers to orchard trees at a Twilight meeting of the Connecticut Pomological Society at March Farms in Bethlehem (50 attendees) *May 24*
- Reported on surveys and survey techniques for exotic insects at a meeting of the Cooperative Agricultural Pest Survey at the Valley Laboratory, Windsor *June 1*
- Spoke about surveys for exotic apple leafrollers at a Twilight Meeting of the Connecticut Pomological Society in Woodstock, CT *June 21*

MARCO, MICHELLE

- Along with Gregory Bugbee and Roslyn Selsky presented a talk to CT DEP staff in Hartford on the CAES Invasive Aquatic Plant Control Program (50 attendees) *September 21, 2006*
- Presented a seminar entitled "Biocontrol of Watermilfoils and Future Goals of the Connecticut Invasive Aquatic Plant Program" at the USDA Agricultural Research Station in Ft. Lauderdale, Florida *September 26*
- With Greg Bugbee and Roslyn Selsky helped host the annual meeting of the Connecticut Federation of Lakes in Jones Auditorium (50 attendees) *October 21*
- Presented a talk entitled "Biological Control of Watermilfoils" at the Connecticut Conference on Natural Resources, held at UCONN, Storrs *March 9, 2007*
- As a guest of the Candlewood Lake Authority at a benefit they held, presented her research on "Biological Control of Eurasian Watermilfoil with the Milfoil Weevil" *April 27, 2007*
- Was interviewed for a newspaper article titled "Tiny bug may benefit the lake" by Robert Miller of the Danbury Times *April 28*
- Instructed students on how to survey Candlewood Lake for plants and milfoil weevils as part of Project CLEAR. This meeting was held at the Candlewood Lake Authority headquarters in Sherman, CT (50 attendees) June 21-22
- Presented information on the milfoil weevil and how to identify it in a lake at a Workshop hosted by CAES on how to identify invasive aquatic plants *June 23*

MARRA, ROBERT E.

- Presented the talk "Single-strand conformation polymorphism (SSCP) in Ramorum Blight survey diagnostics" at the Annual Meeting of the Northeastern Division of The American Phytopathological Society (NED-APS) in Burlington, VT (55 attendees) *November 6-9, 2006*

- Spoke on "Molecular Methods in Ramorum Blight Diagnostics" to a botany class from Quinnipiac University in Jenkins (12 attendees) *November 13*
- Helped teach tree disease diagnostics to students in the Connecticut Tree Protective Association's Arboriculture 101 course (45 attendees) *November 15*
- With Jason White, presented a seminar entitled "Ramorum Blight/Sudden Oak Death: Can We Keep *Phytophthora ramorum* out of Northeastern Forests?" at the University of Massachusetts in Amherst, MA (30 attendees) *November 28*

MATTINA, MARYJANE INCORVIA

- Hosted a group of ICES science teachers on a tour of the Analytical Chemistry Department and presented a talk on the work in progress *July 6, 2006*
- Spoke with students and teachers from the Education Connection Program, a week-long program at the University of New Haven regarding work performed in Analytical Chemistry *July 13*
- Presented a poster entitled "What Chiral Pollutants May Be Trying to Tell Us About Mechanisms of Phytoextraction" at the Fourth Annual Symposium in Plant Biology at the University of Massachusetts, Amherst *October 14*
- Presented a talk at the Quinnipiac University chapter of Sigma Xi (100 attendees) *November 16*
- Toured the mobile counter-terrorism laboratory designed and operated by Hamilton Sundstrand at their Windsor Locks facility *November 17*
- Hosted six staff members from the Connecticut Department of Public Health on a tour of Analytical Chemistry. The DPH was visiting several facilities around the state for input into their new laboratory facility in Rocky Hill *November 28*
- Spoke on "Analytical Chemistry at the Connecticut Agricultural Experiment Station" to the Quinnipiac Chapter of Sigma Xi (50 attendees) *November 29*
- Presented a summary of pertinent laboratory work at a meeting of the FDA Food Emergency Response Network (FERN) Cooperative Agreement Laboratories in Phoenix, AZ *January 23-25, 2007*
- Assisted in organizing the Station's Spring Open House and presented a talk describing our involvement in biofuels research (100 attendees) *April 19*
- Gave a presentation on the Station and the activities of the Department of Analytical Chemistry related to food safety for the monthly meeting of the laboratory preparedness group related to counterterrorism at the Connecticut Department of Public Health (40 attendees) *May 7*
- Presented a talk on the work in progress in the Department of Analytical Chemistry to a group of 12 persons. These were high school teachers from the US and Europe participating in a one week Pfizer-sponsored program headquartered in Groton. The teachers visited Yale University and the Experiment Station with the goal of generating ideas to develop into curriculum enhancements (12 participants) *June 28*

MAYNARD, ABIGAIL

- Presented an Educational Program for Teachers at Lockwood Farm (20 teachers*) July 6, 2006*

- Spoke about the New Crops Program on the Len and Lisa Show on WTIC 1080 Radio (35,000 listeners) *July 22*
- Judged fruits and vegetables at the North Haven Fair *September 7*
- Gave a tour of Lockwood Farm to the Pre-Kindergarten and Kindergarten classes from Hamden Hall Country Day School (38 children, 4 teachers, 6 parents) *September 21*
- Reported on Station activities at the quarterly meeting of the Council on Soil and Water Conservation in Rockfall (22 attendees) *November 7*
- Participated in the Annual Meeting of the Connecticut Pomological Society in Glastonbury *December 5*
- Spoke on "Composting and Utilization of Compost" to the Hamden Rotary Club (18 attendees) *January 15, 2007*
- Reported on white-tailed deer studies at the Station at the Quarterly Meeting of the Council on Soil and Water Conservation in Tolland (22 attendees) *January 23*
- Participated in the 6th Annual Connecticut Organic Land Care Course sponsored by the Connecticut and Massachusetts Chapters of NOFA in Jones Auditorium *January 31-February 6*
- Reported on the Station's IPM involvement in the NRCS's EQIP Program at a meeting of the State Technical Committee Meeting in Tolland (21 attendees) *March 7*
- Hosted a visit by the Girl Scout Troop from Hamden Hall and gave them a tour of the Station (8 children, 2 adults) *April 20*
- Attended a meeting of the Solid Waste Management Advisory Committee (SWAC) of DEP and a meeting of the SWAC Subcommittee on Organic Recycling and Composting in Hartford *April 24*
- Reported on Station activities at the quarterly meeting of the Council on Soil and Water Conservation in Tolland (15 attendees) *May 3*
- Attended a meeting of the Solid Waste Management Advisory Committee (SWAC) of DEP and a meeting of the SWAC subcommittee on Organics Recycling and Composting in Hartford *May 22*
- Spoke about Station research and gave a tour of Lockwood Farm to the 4th grade of Hamden Hall Country Day School (29 children and 2 adults) *May 31*
- Attended a meeting of the Solid Waste Management Advisory Committee (SWAC) of DEP and a meeting of the SWAC Subcommittee on Organic Recycling and Composting in Hartford *June 26*

MCHALE, NEIL A.

- Taught a minicourse on "Basic Botany for Gardeners" for the Federated Garden Clubs of Connecticut in Jones Auditorium *November 28, 2006*
- Presented lectures on plant genetics and conducted laboratory tours for visiting students from Springfield College as part of their Plant Physiology class under Professor Charles Reddington *April 5, 2007*
- Conducted a biotechnology workshop for high school and middle school teachers in the Pfizer Teacher Education Program *June 28*

MERVOSH, TODD L.

- Spoke about weed management to Christmas tree growers at the annual twilight meeting at the Valley Laboratory in Windsor (50 attendees) *July 11, 2006*
- Was interviewed about Japanese knotweed by Steve Gambini of the Waterbury Republican-American *July 13*
- Spoke about management of liverwort, a weed problem in nursery and greenhouse containers at a Connecticut Greenhouse Growers Association Conference in Jones Auditorium, New Haven (40 attendees) *July 20*
- Led representatives of All Habitat Services L.L.C. (Madison), SePRO Corp. (Simsbury), and UAP Timberland (Old Town, ME), on an inspection of his phragmites control research plots in Old Saybrook *July 28*
- Presented two talks on "Managing the toughest lawn weeds" in the demonstration tent on Plant Science Day (50 attendees) *August 2*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group in Wallingford *August 9*
- Participated in a symposium planning meeting for the Connecticut Invasive Plants Working Group at the Valley Lab *September 7*
- Spoke about "Managing horsetail (Equisetum) in landscapes" and "Weed management in container-grown plants" and presented an informational display of weeds at the Nursery & Landscape Research Tour at the Valley Laboratory *September 19*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group in Wallingford *October 2*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group in Wallingford *October 10*
- Was Chair of the "Management" session, spoke on the subject of "Herbicides: How they work, and what happens to them", and presented a research poster with David Gumbart of The Nature Conservancy on "Control of Oriental bittersweet and pale swallowwort at Bluff Point Coastal Reserve" at the Invasive Plants Symposium "Working Together for the Landscape of Tomorrow" in Wallingford (330 attendees) *October 12*
- Participated in a Connecticut Invasive Plant Working Group Planning Committee meeting in Windsor *November 20*
- Along with Rose Hiskes gave a talk on "Invasive Plants" to sixth year certificate education students at Southern Connecticut State University in New Haven (23 teachers each with about 100 students each attended) *November 30*
- Spoke about his research on "Tolerances of Ornamental Shrubs to Halosulfuron, Sulfentrazone and V-10142" and "Efficacy of Glyphosate, Imazapyr, and Triclopyr for Phragmites Management in Connecticut Marsh" at the annual meeting of the Northeastern Weed Science Society in Baltimore, MD (75 attendees) *January 3-5, 2007*
- Participated in a meeting about management of pale swallowwort, an invasive plant, in Westborough, MA *January 23*
- Presented the talk "Herbicides: How They Work and What Happens to Them" at the Fairfield County Master Gardeners Program in Bethel (25 attendees) *January 24*

- Presented a poster on "Evaluation of Herbicides for Phragmites Management in Connecticut Marshes" at the annual meeting of the Weed Science Society of America in San Antonio, TX (400 attendees) *February 5-8*
- Participated in a meeting of the Connecticut Invasive Plant Working Group at the Valley Laboratory (25 attendees) *February 15*
- Spoke about "Herbicide Effects on Tobacco" at the Tobacco Research Meeting in Suffield (145 attendees) *February 21*
- Helped at the Connecticut Flower and Garden Show in Hartford with exhibits for CAES *February 23*
- Presented research posters about management of the invasive plants Oriental bittersweet and pale swallowwort at Bluff Point Coastal Reserve at the Connecticut Conference on Natural Resources in Storrs (300 attendees) *March 9*
- Presented research posters about management of the invasive plants Oriental bittersweet and pale swallowwort at Bluff Point Coastal Reserve at the Rhode Island Natural History Survey's Conference on invasive species in Narragansett, RI (180 attendees) *March 22*
- Spoke about weed management at the annual meeting of the Western Massachusetts Gladiolus Society in Chicopee, MA (20 attendees) *March 24*
- Participated in a scholarship committee meeting for the Connecticut Nurserymen's Foundation in Windsor *March 29*
- Served on the Connecticut Nurserymen's Foundation Scholarship Committee, which interviewed finalists and selected scholarship recipients at a meeting at the Valley Laboratory in Windsor (15 attendees) *April 11*
- Presented information about work/internship opportunities at the Valley Laboratory to students in the Suffield Regional Agriscience Center at Suffield High School (100 attendees) *April 12*
- Presented an informational display of weeds at Plant Science in the Spring held in Jones Auditorium (120 attendees) *April 19*
- Participated in a planning meeting regarding the Invasive Plant Atlas of New England Project in Middlefield (12 attendees) *April 23*
- Spoke about invasive plants and management research as part of the Spring Garden Series at Mystic Seaport (20 attendees) *April 27*
- Participated in a meeting regarding mile-a-minute vine, a new invasive plant in western Connecticut, in Southbury (8 attendees) *May 18*
- Spoke about the Valley Laboratory and presented a display of weeds to a 2nd grade class at Kennedy Elementary School in Windsor (16 student and 2 adult attendees) *May 22*
- Spoke on invasive plants and control methods to the Enfield Garden Club in Enfield (25 attendees) *May 23*
- Co-led an educational hike with David Gumbart of the Nature Conservancy. They talked about their research projects on management of the invasive plants Oriental bittersweet, pale swallowwort, and phragmites at Bluff Point Coastal Reserve in Groton. (14 attendees) *June 6*
- Spoke about weed management at a twilight meeting of the Connecticut Christmas Tree Growers' Association in Berlin (40 attendees) *June 6*

- Met with Greenwich officials, an Audubon Society representative, and Les Mehrhoff and Donna Ellis of UConn regarding management options for mile-a-minute vine in Greenwich *June 25*

MOLAEI, GOUDARZ

- Presented a talk entitled "Vertebrate hosts of mosquitoes involved in transmission of West Nile and Eastern Equine encephalitis viruses in the northeastern United States" and presented a poster display co-authored by Dr. Theodore Andreadis and colleagues from Yale University entitled "Habitat determines host feeding patterns of *Culex salinarius*, a bridge vector of West Nile virus in Connecticut, USA" at the Annual Conference of the Wildlife Disease Association and the American Association of Wildlife Veterinarians held at the University of Connecticut, Storrs (more than 250 attendees) *August 9, 2006*
- Presented a poster co-authored by Theodore Andreadis and Philip Armstrong entitled "Epizootiology of Eastern Equine Encephalitis Virus in Northeastern USA: Lessons From Host Preference of Mosquito Vectors" at the 37th Annual Conference of the Society for Vector Ecology, held in Anchorage, Alaska (250 attendees) *September 30*
- Presented an overview of collection and processing techniques for blood meal analysis of mosquitoes to a group of public health and mosquito control officials from Massachusetts (12 attendees) *March 7, 2007*
- Presented an invited talk entitled "Olfaction in Mosquitoes and its Implication for the Transmission of the West Nile and Eastern Equine Encephalitis viruses" at the annual meeting of the New Jersey Mosquito Control Association held at Atlantic City, NJ *March 14*

MUSANTE, CRAIG

- Toured the mobile counter-terrorism laboratory designed and operated by Hamilton Sundstrand at their Windsor Locks facility *November 17*

NAIL, WILLIAM

Throughout the year visited numerous vineyards and gave advice and found solutions for various problems being experienced by grape growers and vintners throughout the state.

- Presented a talk on the CAES viticulture program to a group of high school teachers at Lockwood Farm (20 teachers) *July 6, 2006*
- Participated in the annual meeting of the American Society of Enology and Viticulture Eastern Section in Rochester, NY (180 attendees) *July 9-11*
- Participated in a New England Wine Grape Growers meeting in Little Compton, RI (35 attendees) *July 13*
- Evaluated performance of historic grapevines at Harkness State Park in Waterford *July 27*
- Gave a presentation to members of the Connecticut Vineyard and Winery Association and an overview of CAES winegrape research at Gouveia Vineyards (48 attendees) *August 5*
- Participated in a grape pathology workshop at the University of Connecticut (15 attendees) *August 9*

- Participated in a meeting of the Connecticut Grape and Winery Association at the Valley Laboratory (17 attendees) *September 11*
- Participated in a meeting of the Connecticut Farm Winery Council *September (5 attendees) 11*
- Evaluated bird predation at Connecticut Valley Winery in New Hartford *September 14*
- Participated in a grape pathology seminar at the University of Connecticut (8 attendees) *September 29*
- Participated in a New Grape Grower workshop in Sandown, NH (62 participants) *November 2*
- Participated in the annual meeting of NE-1020: Multi-State Evaluation of Winegrape Cultivars and Clones in Raleigh, NC (28 participants) *November 15-16*
- Participated in a viticulture workshop at the Cornell Long Island Horticultural Research & Extension Center *December 6*
- Participated in a meeting of the Connecticut Grape and Wine Association at the Valley Laboratory (12 attendees) *January 8, 2007*
- Participated in a meeting of the Connecticut Farm Wine Council at The Station (5 attendees) *January 8*
- Hosted a workshop, "Grape Management Resources" and gave a presentation "Viticulture Research at CAES" at the Valley Laboratory (48 attendees) *January 23*
- Participated in a meeting of the Connecticut Grape and Wine Association at the Valley Laboratory (14 attendees) *February 21*
- Participated in the Viticulture 2007 Conference and New York Wine Industry Workshop in Rochester, NYH *February 7-9*
- Participated in the Wineries Unlimited Symposium in Valley Forge, PA *March 6-9*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory (20 attendees) *March 19*
- Participated in a meeting of the Connecticut Farm Wine Development Council (7 attendees) *March 20*
- Participated in the National Viticulture and Enology Extension Leadership Conference in Nashville, TN (27 attendees) *March 27-29*
- Participated in a Grape Bud Necrosis Clinic at Sakonnet Vineyards, Little Compton, RI (19 attendees) *April 18*
- Participated in a meeting of the Connecticut Grape and Winery Association at the Valley Laboratory (20 attendees) *May 7*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Valley Laboratory (5 attendees)*May 7*
- Was interviewed about the Connecticut grape and wine industry by Leonard Felson for Connecticut Magazine *May 21*
- Participated in a meeting of the Connecticut Grape and Winery Association at the Valley Laboratory (19 participants) *June 4*
- Participated in a meeting of the State Consulting Committee for Agricultural Education at the Freund's Farm Market in East Canaan (12 participants) *June 11*
- Participated in a meeting of the Connecticut Grape and Winery Association at the Valley Laboratory *June 4*

- Participated in a meeting of the Sate Consulting Committee for Agricultural Education at the Freund Farm Market in East Canaan *June 11*

PETERSON, RICHARD B.

- With Dr. Neil Schultes, presented current research results and discussed collaborative experiments with Dr. Harry Frank at the Department of Chemistry at the University of Connecticut at Storrs *October 25, 2007*
- Participated in the Annual Meeting of the Sigma Xi as voting delegate for the Quinnipiac Chapter in Detroit, Michigan *November 2-5*
- Spoke to sixth grade students from Spring Glen School about how plants capture light energy for photosynthesis *November 29*
- Worked with 7th grade student Iris Cruz of the Betsy Ross Arts Magnet School on a science fair project entitled "Photosynthesis in Leaf Disks" *January, 2007*
- While on a sabbatical leave, he conducted joint research with Dr. Agu Laisk of the University of Tartu on the role of the psbS protein in protection of the photosynthetic apparatus from oxidative damage. He presented a lecture on "Spectroscopy of Photosynthetic Pigment Proteins" to scientists at the University's Institute of Physics *February 1*
- With Dr. Neil Schultes, attended the 24th Annual Eastern Regional Photosynthesis Conference at Woods Hole, MA and presented posters "Photosynthetic properties of *Nicotiana benthamiana* blocked for expression of PsbS" and "Genetic tools for investigating the role of PsbS in NPQ" *April 20-22*
- Presented the lecture "Genetic Regulation of Light-Harvesting: A yield enhancing Opportunity?" at the DeKalb Plant Genetics Laboratory in Mystic, CT *May 24*

PIGNATELLO JOSEPH J.

- Presented the poster "A Concentration-Dependent Multi-term Linear Free Energy Relationship for Sorption of Organic Compounds to NOM Based on the Hexadecane Dilute-Solution Reference State" at the 18th World Congress of Soil Science, Philadelphia, PA (40 - 2,000 attendees) *July 9-15, 2006*
- Presented the poster "An Isotope Exchange Technique to Validate True Sorption Hysteresis and Assess Its Underlying Causes" at the 13th Meeting of the International Humic Substances Society, University of Karlsruhe, Germany (300 attendees) *July 30*
- Presented the poster "A Concentration-Dependent Multi-Term Linear Free Energy Relationship for Sorption of Organic Compounds to NOM Based on the Hexadecane Dilute-Solution Reference State" at the 13th Meeting of International Humic Substances Society, University of Karlsruhe, Germany (300 attendees) *July 30*
- Coauthored the paper "Conditioning-Annealing Studies of Natural Organic Matter Solids Linking Irreversible Sorption to Irreversible Structural Expansion" at the 13th Meeting of the International Humic Substances Society, University of Karlsruhe, Germany (300 attendees) *July 30*
- Was an invited Departmental Seminar speaker and gave the talk "Interaction of Pollutants with Natural Organic Matter Viewed from the Perspective of the Sorbent" at the Engler Bunte Institute, University of Karlsruhe, Germany (15 attendees) *July 31*

- Presented a Lunch Club seminar with Dr. Jason White entitled "Getting the scientific grant: What me Worry?" *October 11*
- Presented the talk "Effect of Natural Organic Matter on the Surface and Adsorptive Properties of Char Particles in Soil in a Symposium on Biogeochemical and Biophysico-Chemical Characterizations of Soil Microsite Processes" at the Soil Science Society of America Annual Meeting held in Indianapolis, IN (200 attendees) *November 12-16*
- Presented a poster entitled "Summary of Evidence Supporting the Glassy Polymer Sorption Model for Nonionic Organic Compounds in SOM" at the Soil Science Society of America Annual Meeting, held in Indianapolis, IN (600 attendees) *November 12-16*
- Served as a judge at the Langer Graduate Student Symposium in Engineering, held at Yale University December 1
- Presented the talk "Facilitated Bioavailability of PAHs to Natice Soil Bacteria Promoted by Nutrient Addition" in a Symposium on Influence of Bioactivity on Mass Transfer Processes Occurring Within Contaminant Source Areas, at the Annual Meeting of the American Geophysical Union, held in San Francisco, CA (100 attendees) *December 11-15*
- Presented an invited seminar entitled "Interactions of Organic Compounds with Natural Organic Matter: Sorption from the Viewpoint of the Sorbent to the Chemistry and Biochemistry Department, Florida State University, Tallahassee, FL *January 31, 2007*
- Presented an invited talk entitled "Use of NMR Spectroscopy to Probe Fundamental Questions about Contaminant Sorption to Organic Matter" at Northeastern University, Boston *March 21*
- Presented an invited talk "DOM Transport in Natural Solids: Lessons from the Behavior of Organic Pollutants" at the European Geophysical Union General Assembly, held in Vienna, Austria *April 16-21*

RATHIER, THOMAS

- Presented a demonstration of container media physical characteristics at the Container Media Workshop held in Jones Auditorium (65 attendees) *July 20, 2006*
- Answered questions on gardening on Garden Talk on WTIC AM (35,000 listeners) *July 22*
- Organized and hosted the annual Nursery and Landscape Research Tour at the Valley Laboratory and spoke about conifer nutrition and container physical characteristics (65 attendees) *September 18*
- Taught the Soils and Tree Relationship Session of Arboriculture 101 in Jones Auditorium (45 students) *September 20*
- Was interviewed about shade tobacco culture by Janice Poppada of the Hartford Courant *October 24*
- Presented a paper entitled "Plasticulture strategies to improve timing of N availability to shade grown tobacco" at the 33rd National Agricultural Plastics Congress in San Antonio (50 attendees) *November 4*

- Was interviewed about the importance of fall tillage of cropland by Tony Spinelli of the Connecticut Post *November 9*
- Taught tree diseases at the laboratory session of Arboriculture 101 in Jones Auditorium (45 students) *November 15*
- Helped Arboriculture 101 students review the course in Jones Auditorium (45 students) *December 6*
- Taught the Soils and Tree Relationship session of Arboriculture 101 in Jones auditorium (45 students) *January 24, 2007*
- Spoke on nitrogen utilization and general problems at the CAES Tobacco Meeting in Suffield (100+ attendees) *February 21*
- Organized a visit and tour of the Valley Laboratory by management science students from Springfield College and spoke to the group about diagnostic services (80 attendees) *March 6*
- Taught tree diseases at the laboratory session of Arboriculture 101 in Jones Auditorium (45 students) *March 28*
- Helped Arboriculture 101 students review the course in Jones Auditorium (45 students) *April 17*
- Spoke about healthy soils and gardening at a "Lunch and Learn" session at the CT Department of Banking (30 attendees) *May 10*
- Gave a talk on "Integrated Pest Management" at Farm-City in Shelton (700 students from Bridgeport, Stratford, and Torrington) *May 15-17*
- Spoke on "Healthy soils and gardens" to the Heritage River Garden Club in Southbury (50 attendees) *May 16*
- Answered gardening and landscaping questions on House Calls on radio station WDRC in Bloomfield (8,000-10,000 listeners) *May 26*

RIDGE, GALE
- Was interviewed about Gypsy Moth outbreak in Middlesex County on WTIC Radio *July 5, 2006*
- Was interviewed about "Illustrating the Connecticut Mosquito Guide" by Maria Walker of the Reading Pilot Newspaper *August 8*
- Was interviewed about the Connecticut Mosquito Guide by Maria Walker of the Reading Pilot newspaper *August 9*
- Was interviewed about monarch butterfly migration by Hui of the Greenwich times *August 16*
- Was interviewed about the Orange Striped Oakworm by Gil Simmons of WTNH television, Channel 8 *September 7*
- Discovered Khapra beetle in Connecticut in May (announced in September). Khapra beetle is a serious pest of stored products. The problem was corrected by USDA, APHIS, PPQ *September 11*
- Was interviewed about Gypsy moth and Orange Striped oakworm foliage feeding and how this effects fall foliage colors by Shelley Wong of AP News, Hartford *October 12*

- Was interviewed about the Luna moth and its comeback in the state of Connecticut by Nelson Cecarelli of the CT Academy of Science and Engineering, Hartford *October 13*
- Was interviewed about black widow spiders found in grapes shipped from California by Tracy of Channel 3 TV, Hartford *October 20*
- Was interviewed about black widow spiders in grapes by Chris parker of the Republican American, Torrington *November 2*
- Spoke on the Heteropteran endothorax at the Entomological Society of America National Convention in Indianapolis, IN *December 13, 2006*
- Identified a new species of at to the State of Connecticut, The Guinea Ant, *Tetramorium bicarinatuum*. They are generalized scavengers and they are confined to greenhouses *December 20*
- Spoke on the heteropteran endothorax at the Entomological Society of America national convention in Indianapolis *December 20*
- Was interviewed about plant and animal communities affected by climate Change by Judy Benson of The Day *March 7, 2007*
- Was interviewed about ticks and Lyme disease by Eric Smilie of Vio Magazine in San Francisco *March 12*
- Discovered an Asian tramp snail on a palm in Fairfield; a new unnamed species of Diapriidae wasp, genus Basalys, found in pit fall traps on a farm; and an exotic thrip at the Beardsley Zoo *March 26*
- Was interviewed about colony collapse disorder of honey bees by Darren Hobbs of the Waterford times *May 25*

ROBB, CHRISTINA
- Participated in the Thermo Liquid Chromatography/Mass Spectrometry Users meeting in New Haven *October 10, 2007*
- Spoke on analytical techniques used in screening the food supply at the Eastern Analytical Symposium in New Jersey (200 attendees) *November 14*
- Participated in a biodiesel symposium held at UConn *January 11, 2007*
- Participated in LC Resources Training “Fundamentals of LC and LC-MS” *April 11-13*
- Served on the Science Research Review Panel for CT High School Innovation EXPO ’07 *May 12*
- Participated in a Science Research Review Panel for the 2007 CT High School Exposition in Hartford *May 14*
- Participated in an FDA Basic Mass Spectrometry Course held in Cincinnati, Ohio *June 5-9*

RUTLEDGE, CLAIRE
- Presented the talk “Potential pheromones of an invasive longhorn beetle, *Callidiellum rufipenne*” at the Annual Meeting of the Entomological Society of America in Indianapolis, IN *December 11, 2006*

- Displayed a poster entitled “A tumbling flower beetle is attracted to sweet birch oil” at the Annual Meeting of the Entomological Society of America in Indianapolis, IN *December 12*
- Gave the talk “Insects that Attack Trees” for the Greater New Haven Bonsai Society (10 attendees) *January 9, 2007*
- Taught a class at the Bartlett Arboretum for aspiring arborists “Introduction to IPM and Insects Attacking Trees” in Stamford (18 attendees) *February 15*
- Taught the CTPA Arboriculture 101 class “Insects Attacking Trees and Shrubs” in Jones Auditorium (50 attendees) *February 21*
- Gave the talk “Emerald Ash Borer and European Wood Wasp Surveys in 2006” at the Forest Health Monitoring Workshop held in Jones Auditorium (35 attendees) *February 22*
- Was interviewed about Emerald Ash Borer by a writer from the New York Times *February 27*

SANDREY, STEPHEN

- Presented a display on the Bird & Butterfly Garden, Aquatic Invasive Plants, Ramorum Blight, and other current research projects and distributed Station literature for “Celebrating Agriculture” at the Woodstock Fair in Woodstock (950 visitors to booth) *September 23, 2006*
- Manned the Experiment Station exhibit at the CNLA Winter Meeting in Wallingford, CT *January 4, 2007*
- Answered questions from the public and manned the display at the 2007 Connecticut Flower and Garden Show in Hartford *February 24*
- Participated in ICS Training, Full Scale exercise (Session Woods Wildlife Management Area) in Burlington, CT *March 6-8*
- Set up sound equipment for Agriculture Day at the Capitol, *March 21*
- Presented an archivist report to The Horticultural Inspection Society in Jackson, New Hampshire *April 2-5*
- Staffed an exhibit on honey bees and biodiesel at the CPTV Family Science Expo in Hartford *April 28*
- Presented good beekeeping practices to students at the Second Hill Lane School in Stratford, CT *June 1*

SCHULTES, NEIL P.

- Presented a seminar on “The Genetic Engineering Toolbox: Real-life GMO Detection Techniques” to the Working Group on Genetically Engineered Plants – part of the Bioethics at Yale Program at the Institute for Social & B Policy Studies *October 19, 2006*
- Presented the lecture “Crop Evolution and Genetics” to the Shoreline Garden Club in Madison *October 24*
- Presented current research results and discussed collaborative experiments with Dr. Harry Frank at the Department of Chemistry at the University of Connecticut at Storrs *October 25*

- Hosted science teachers from Lyman Hall High School on a laboratory tour *November 6*
- Gave the lecture "Genetically Modified Plants and Agriculture" to the Quinnipiac Sigma Xi chapter at Quinnipiac University, Hamden *November 16*
- Presented a series of lectures on "Application of Biotechnology to Modern Agriculture" to an undergraduate seminar Science 130 class at Yale University *December 1, 8, & 14*
- Presented lectures on plant genetics and conducted laboratory tours for visiting students from Springfield College as part of their Plant Physiology class under Professor Charles Reddington *April 5, 2007*
- With Dr. Richard Peterson attended the 24th Annual Eastern Regional Photosynthesis Conference at Woods Hole, MA and presented posters "Photosynthetic properties of *Nicotiana benthamiana* blocked for expression of PsbS" and "Genetic tools for investigating the role of PsbS in NPQ" *April 20-22*

SELSKY, ROSLYN

- Presented a paper entitled "Using GIS to Map Invasive Aquatic Plants in Connecticut" at the ESRI User Conference held in San Diego, CA *August 6-9, 2006*
- With Gregory Bugbee, presented results of the CAES Aquatic Plant Survey of Candlewood Lake to the Candlewood Lake Advisory Committee at the Northeast Utilities headquarters in Sharon, CT *October 11*
- Presented a poster entitled "The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program" at the Connecticut Invasive Plant Working Group's Symposium held in Wallingford *October 12*
- With Greg Bugbee and Dr. Michelle Marko helped to host the annual meeting of the Connecticut Federation of Lakes in Jones Auditorium *October 21*
- Gave the talk "Using GIS to Map Invasive Aquatic Plants in Connecticut" at the Northeast Arc Users Conference in Mystic *November 13-15*
- Presented a talk entitled "Using GIS to Map Invasive Aquatic Plants in Connecticut" at the Northeast Aquatic Plant Management Society Meeting held at Mt. Snow, Vermont (150 attendees) *January 17, 2007*
- Presented an overview of the Invasive Aquatic Plant Program's geospatial work to officials from USDA Cooperative State Research, Education and Extension Service (CSREES) *January 25*
- Presented an overview of the Invasive Aquatic Plant Program's geospatial work to officials from Texas A&M University *January 31*
- Staffed a Station booth at the Connecticut Turf and Landscape Conference at the Connecticut Convention Center *February 1*
- Gave two workshops at the University of New Haven on the identification of invasive aquatic plants at the Connecticut Envirothon (60 student participants) *February 3*
- Talked about the Invasive Aquatic Plant Program's website during a Lunch Club at the Station *February 13*
- Met with officials from First Light Power and representatives from the DEP and Candlewood, Lillinonah and Zoar Lakes in New Milford to discuss the invasive

plants in the three lakes and possible future study and management methods *February 20*

- Presented a poster entitled "The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program" at the Connecticut Conference on Natural Resources, held at UCONN, Storrs *March 9*
- Met with officials from FirstLight Power Resources to discuss future invasive aquatic plant research options on Lakes Candlewood, Lillinonah, and Zoar *March 29*
- Presented a display poster entitled "The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program" at the Sikorsky Earth Day Celebration in Stratford *April 19*
- Presented a display poster entitled "The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program" at CAES Spring Open House *April 19*
- Assisted students in the identificaiton of aquatic organisms at the Connecticut Envirothon *May 17*
- Met with the Indian Lake Association to talk about the 2006 Invasive Aquatic Plant Program Survey of that lake and answer questions from the Association members (30 attendees) *June 5*
- Led a workshop on the identification of aquatic plants at the New England Chapter of the North American Lake Management Society's 2007 New England Lakes Conference held at the University of Connecticut (6 people in attendance) *June 8*
- Was interviewed about the Invasive Aquatic Plant Program and the Invasive Aquatic Plant Workshop held in June by the Shoreline Times *June 12*
- Was interviewed about the Invasive Aquatic Plant Program, Invasive Aquatic Plant Workshop by The Source *June 13*
- Was interviewed about the Invasive Aquatic Plant Program's Invasive Aquatic Plant Workshop by the Meriden Record Journal *June 15*
- Taught a group of students participating in Project CLEAR on Candlewood Lake about the identification of aquatic plants, and led these students in the collection of data on *M. spicatum* and the water milfoil weevil *June 21-22*
- Organized and led a workshop on the identification of invasive aquatic plants held at the Station (15 attendees) *June 23*
- Met with representatives from FirstLight Power Resources and Candlewood Lake Authority to discuss possible remote sensing options for Lakes Candlewood, Lillinonah, and Zoar *June 23*

SHORT, MICHAEL

- Administered the CT Accredited Nursery Professional Course as a member of the CNLA Education Committee *August 2006*
- Administered the final exam of the CNLA Connecticut Accredited Nursery Professional Course in Southington (50 participants) *November 21*
- Administered the final exam of the CNLA Connecticut Accredited Nursery Professional Course in Southington (50 participants) *November 28*
- Participated in an Education Committee meeting of the CT Nursery and Landscape Association in Cromwell *February 15, 2007*

- Participated in an Education Committee meeting of the CT Nursery an Landscape Association in Cromwell *March 9*
- Participated in the CT Greenhouse Growers Association "Evening At The Greenhouse" program at Cromwell Growers, Cromwell *March 15*
- Participated in the CT Nursery and Landscape Association Open House at Specialty Growers in Cheshire *June 13*

SLETTEN, PAMELA
- With Dr. Sandra Anagnostakis, was interviewed about chestnuts as a food crop and techniques for growing chestnut trees by Laurie Sanders for a National Public Radio program to be produced by Massachusetts Public Radio *November 27, 2006*

SMITH, VICTORIA L.
- Participated in the Connecticut Nursery and Landscape Association Summer Meeting held at Young's Nursery in Woodbury *July 12, 2006*
- Participated in a meeting of the Administrative Council of the Northeast Sustainable Agriculture Research and Education (NE-SARE), held at Bangor and Orono, Maine (25 attendees) *July 16-19*
- Was interviewed about honey bees and beekeeping by Grant Walker of the Hartford Courant *July 27*
- Participated in a program review conducted by the US Forest Service-Durham (New Hampshire) Field Office, by presenting talks on gypsy moth, forest health plots, and survey information, held in Jones Auditorium (25 attendees) *August 8-9*
- Participated in a workshop on grant proposal writing, held by North East Sustainable Agriculture Research and Education (NE-SARE); held in Manchester, New Hampshire (10 attendees) *August 31*
- Participated in the Nursery and Landscape Research Tour, held at the Valley Laboratory in Windsor, by organizing a table on Exotic Pests and Diseases (60 participants) *September 19*
- Was interviewed about anthracnose diseases of shade trees and potential impact on autumn color by Steve Grant of the Hartford Courant *September 21*
- Organized a meeting of Forest Pest Cooperators with the Durham (New Hampshire) Field Office of the US Forest Service, held at the Colony Inn in New Haven (25 participants) *September 26-27*
- Participated in a meeting of the National Plant Board *Phytophthora ramorum* Working Group held at the Maryland Department of Agriculture in Annapolis, MD *October 24-26*
- Participated in the Eastern Region Cooperative Agricultural Pest Survey Meeting held in Raleigh, NC (200 participants) *November 13-16*
- Participated in the Annual Meeting of the Connecticut Pomological Society *December 5*
- Manned the Station's table and presented 4 talks: "Gypsy Moth Outbreaks of 2005 and 2006"; "Bedbugs: an Increasing Menace"; "Disease Highlights of 2006"; and "*Phytophthora ramorum*: Program Updates and New Findings" at the CT Nursery

and Landscape Winter Symposium and Expo in Wallingford (200 attendees) *January 3-4, 2007*

- Organized the CAES speakers and gave the talk "Gypsy Moth Outbreaks of 2005 and 2006" at the CT Tree Protective Association Winter meeting in Southington (800 attendees) *January 18*
- Participated in a meeting of the Northeast Sustainable Agriculture Research and Education Professional Development Program in Manchester, NH (30 attendees) *January 23-24*
- Participated in a meeting of the CAPS-Early Detection & Rapid Response team, held at the Urban Forestry Center in Portsmouth, NH (30 participants) *February 6*
- Organized the annual Forest Health Workshop, held in the Jones Auditorium, and presented two talks : "Gypsy Moth Outbreaks of 2005 and 2006" and "*P. ramorum* Survey Activity for 2006 and 2007" (30 attendees) *February 22*
- Participated in a meeting of the Northeast Sustainable Agriculture Research and Education Administrative Council, held at Essex Junction, Vermont (30 participants) *February 28-March 2*
- Participated in a full-scale Incident Command System Exercise, held at Sessions Woods Wildlife Management Area, Burlington (60 participants) *March 6-8*
- Presented a talk at the Connecticut Conference on Natural Resources, held at UCONN, Storrs, titled "Ramorum Blight: A Potential New Threat to Connecticut Forests" (40 attended the talk, 150 participants attended the meeting) *March 9*
- Helped provide the sound system for the various speeches at Ag Day at the Capitol, Hartford *March 21*
- Completed USDA-Biotechnology Regulatory Services Course 201, Regulations and Processes, held at the Eagle Mountain House in Jackson, NH (30 participants) *April 2*
- Participated in the 82nd Annual Meeting of the Eastern Plant Board, held at the Eagle Mountain House in Jackson, NH (100 participants) *April 2-5*
- Participated in a training workshop for aquatic sampling for *P. ramorum*, conducted by the US Forest Service and held at Soldiers Delight Natural Environment Area, part of Patapsco Valley State Park, Owings Mills, MD (15 participants) *April 17-19*
- Participated in the Cooperative Program Review, with a presentation on Station research in cooperation with DEP, presented at DEP headquarters in Hartford (15 participants) *May 16*
- Participated in a Digital Aerial Sketch Mapper training session, held by the US Forest Service North East Region, at the Urban Forestry Center in Portsmouth, NH (30 participants) *May 22*
- Participated in the Twilight Meeting of the CT Pomological Society, held at March Farms in Bethlehem (50 participants) *May 24*
- Participated in a twilight meeting of the CT Pomological Society, held at Woodstock Orchards in Woodstock (60 participants) *June 21*

STAFFORD, KIRBY C.

- Was interviewed about the lone star tick by Fran Schneido of WCBS Radio *July 7, 2006*

- Participated in a meeting of the Northeast Regional Association of State Agricultural Experiment Station Directors in Geneva, NY *July 10-11*
- Spoke about ticks and Lyme disease research to students from the University of New Haven who were touring the Station *July 13*
- Was interviewed about Lyme disease cases in Wilton and Connecticut for 2005 by Jackie McKean of the Wilton Bulletin *July 17*
- Was interviewed about gypsy moth activity in Connecticut by Anahad O'Connor of the New York Times *July 17*
- Was interviewed about tick activity by Judy Benson of The Day of New London *July 26*
- Was interviewed about the relationship between deer, ticks, and Lyme disease by Cara Loriz of the Shelter Island Reporter *July 31*
- Spoke on Station organization and new activities, and directed discussion on forestry research at the Experiment Station, for the US Forest Service Cooperative Forest Health Program Review in Jones Auditorium. Updates on survey and research work were also presented by Dr. Victoria Smith, Dr. Carole Cheah, Dr. Richard Cowles, Dr. Chris Maier, Dr. Claire Rutledge, Dr. Jeffrey Ward, Scott Williams, Dr. Robert Marra and Dr. Sandra Anagnostakis *August 8-9*
- With Dr. Louis Magnarelli, conducted diversity training for new employees in Jones Auditorium *August 21*
- With Dr. Jeffrey Ward participated in a US Forest Service Northern Research Station Invasive Species Research Program Technical Advisory Meeting in Avon, Connecticut *August 30*
- Was interviewed about the increase in the tick population and the use of insecticides for tick control by Carla Bigelow of the Cornwall Chronicle *September 6*
- Was interviewed about tick abundance and the increase in tick-associated illnesses in the New London area by Judy Benson of the New London Day *September 6*
- Was interviewed about the gypsy moth by Bob Miller of the Danbury News Times *September 8*
- Was interviewed about ticks and Lyme disease by Edie Clark of Yankee Magazine *September 19*
- Welcomed state forest health cooperators and staff from the US Forest Service to New Haven for a meeting held at the Colony Inn in New Haven (20 attendees) *September 20*
- Spoke about the Experiment Station and results of our forest health surveys at the Connecticut Forest Research Forum organized by Dr. Jeffrey Ward and held at the West Hartford Campus of the University of Connecticut (200 attendees) *September 28*
- Presented a talk entitled "Current trends with Acaricides for Targeted Tick Control" in a symposium on vector control at the Annual Meeting of the Society for Vector Ecology in Anchorage, Alaska (125 attendees) *September 30*
- Presented the talk entitled "Controversies and Public Acceptance of Strategies for the Prevention of Lyme Disease" in a symposium on vector control and public engagement at the Annual Meeting of the Society for Vector Ecology in Anchorage, Alaska (100 attendees) *October 3*

- Spoke on ticks and Lyme disease at the Guilford Senior Citizens Center in Guilford (13 attendees) *October 13*
- Spoke to Lyman Hall teachers on a tour of the Station about activities and research in the Department of Entomology *November 6*
- Participated in the Southern New England Beekeeper Assembly in New Haven *November 18*
- Was interviewed about adult tick activity during the mild fall season by Dana Whalen at WTIC-Radio *November 27*
- Presented a poster with Anuja Bharadwaj on research on the fungus *Metarhizium anisopliae* for tick control at the Annual Meeting of the Entomological Society of America in Indianapolis, IN *December 12*
- Was interviewed about tick infection rates by Mary Walker of the Redding Pilot *December 18*
- Participated in the CNLA Winter Meeting in Wallingford *January 3-4, 2007*
- Participated in a meeting of the Multi-state Project NE-1014 in Atlantic City, NJ *January 18-19*
- Welcomed attendees to the Experiment Station at the Bedding Plant Workshop in Jones Auditorium (37 attendees) *January 23*
- Was interviewed about Lyme disease reporting and tick testing by Alison Damast of the Stamford Advocate *January 30*
- Spoke on Pest Management: Ticks and Lyme Disease at the NOFA Annual Course in Organic Land Care in Jones Auditorium (70 participants) *February 5*
- Welcomed state foresters and staff from USDA-PPQ to our annual Forest Health Workshop in Jones Auditorium (30 Participants) *February 22*
- Provided a research update on tick control to the Ledge Light Health District Advisory Committee as part of the Community Lyme Disease Prevention Project (15 participants) *February 23*
- Spoke on the relationship between deer and Lyme disease and vehicle collisions and participated on an expert panel on wildlife issues at the Westport Weston Health District Wildlife Symposium opening plenary session in Weston (40 participants) *February 27*
- Was interviewed about honey bees and colony collapse disorder by Janice Podsada of the Hartford Courant *February 28*
- Participated as part of the Unified Command in an Incident Command System (ICS) test exercise for Emerald Ash Borer by USDA/APHIS/PPQ at Sessions Woods in Burlington, and conducted a mock press conference as part of the exercise *March 6-8*
- Was interviewed about honey bees and colony collapse disorder by James DiGiuseppe of WTIC Radio *March 9*
- Spoke on tick control at a meeting of the New England Chapter of the Wildlife Society in Turner Falls, MA (50 attendees) *March 21*
- Was interviewed about colony collapse disorder and bees in Connecticut by Gerrad Newman of the Wilton Villager *March 22*
- Participated in the meeting of the Northeast Regional Experiment Station Directors (NERA) in Baltimore, MD *March 27-28*

- Spoke about tick-borne diseases and tick management to landscapers at the Torrington Area Health District Offices in Torrington (12 attendees) *March 21*
- Spoke on tick management and Lyme disease prevention at the Cornwall Town Hall (100 attendees) *March 31*
- Spoke on ticks and tick management at the Holcomb Farm Learning Center in West Granby, CT (15 attendees) *April 4*
- Spoke on ticks and Lyme disease at a Lions Club meeting in Bethany (20 attendees) April 10
- Was interviewed about bees and colony collapse disorder by Dan Kain of Channel 3 News *April 17*
- Spoke on ticks and Lyme disease prevention at the Yale Peabody Museum as part of their Lyme & Lobster/Biodiversity Day (30 attendees) *April 19*
- With Rose Hiskes, staffed a CAES booth on ticks at the Yale Peabody Museum (2,000 attendees) *April 19*
- Was interviewed about bees and colony collapse disorder by Fran Kefalas, Page Editor of the Norwich Bulletin *April 20*
- Participated in a USDA/CSREES Planning and Evaluation mini-conference in Seattle, WA *April 23-24*
- Was interviewed for an update on colony collapse disorder by Janice Posada of the Hartford Courant *April 30*
- Spoke on tick management issues at the Aquarion Water Company in Monroe, CT (8 attendees) *May 3*
- Was interviewed about honey bees by Jeff Kurz of the Record Journal *May 4*
- Was interviewed about bees and colony collapse disorder by Elaine Stall of the New London Day *May 4*
- Organized a visit to CAES and met with Dr. Daniel Rossi, Executive Director of the Northeast Regional Association of State Agricultural Experiment Station Directors (NERA) *May 7*
- Was interviewed about a reported drop in Lyme disease cases in Connecticut for 2006 by Michael Dinan of the Greenwich Times *May 14*
- With Dr. Victoria Smith, participated in the Connecticut Cooperative Management Review of the forestry program in Hartford by the U.S. Forest Service *May 16*
- Spoke on ticks and Lyme disease prevention at Aetna Insurance Headquarters in Hartford (50 attendees) *May 17*
- Spoke on ticks and Lyme disease prevention for staff of the Aquarion Water Company in Easton, CT (20 attendees) *May 25*
- Spoke on the Africanized honey bee plan at a meeting of the Backyard Beekeeprs Association in Weston, CT (100 attendees) *May 29*
- Was interviewed about ticks and Lyme disease by Sam Gingerella of WTIC radio *May 30*
- Spoke on the current status of ticks and tick control research at Lake Gaillard, North Branford for a Natural Resources Council tour *May 31*
- Was interviewed about ticks, Lyme disease, and expectations for 2007 by Kate Carey for the Backus Hospital Magazine *June 1*

- Spoke on poultry insect pests and natural enemies at the 2007 North Atlantic Poultry Biosecurity and Pest Management Workshop at the University of Connecticut (10 attendees) *June 2*
- Was interviewed about Lyme disease cases and tick activity by Abram Katz of the New Haven Register *June 5*
- Spoke on ticks and Lyme disease at a meeting of the Joseph Lawrence School of Nursing Alumni Association in Old Lyme *June 6*
- Was interviewed about risk of Lyme disease to landscapers by Rinker Buck of the Hartford Courant *June 7*
- Spoke on ticks and Lyme disease at the Glastonbury Wellness Expo in Glastonbury (6 attendees) *June 9*
- Participated in a meeting of the Connecticut Beekeepers Association at Lockwood Farm *June 23*
- Spoke on the history of the Station and West Nile virus and Lyme disease, and presented a session on ticks under the microscope to teachers visiting the Station under the sponsorship of Pfizer, Inc (11 attendees) *June 28*

STILWELL, DAVID
- Hosted a committee meeting of the Connecticut Community Gardens Association *November 14, 2006*
- Co-presented (with Dawn Pettinelli of UCONN) a paper "Getting the lead out: Searching for lead in community gardens and greenspaces" at the 5th Annual Community Gardening Conference held in New Haven *June 16, 2007*

STONER, KIMBERLY A.
- Participated in the Northeast Pesticide Summit, sponsored by the Toxics Action Center in Worcester, MA *July 8, 2006*
- Chaired a meeting of the NOFA Organic Land Care Committee, Valley Laboratory, Windsor *July 11*
- Participated as a trainer in the final session of the Organic Agriculture Professional Development Program, Ithaca, NY *July 12-14*
- Participated in a meeting of the Board of Directors of the Northeast Organic Farming Association of Connecticut, Northfordy Farm, Northford, CT *July 16*
- Answered insect and garden questions on "Len and Lisa's GardenTalk" on WTIC Radio, Farmington *July 22*
- Was interviewed about community farms in Connecticut and plans for a community farm at Boulder Knoll in Cheshire by Ron Gagliardi for a local television show "Spotlight on Cheshire" *July 26*
- Participated in a professional multidisciplinary program examining two farms in Connecticut for agricultural, environmental, and economic sustainability, Vernon, CT *August 7-10*
- Participated in a forum to develop a National Action Plan for Organic Agriculture, Amherst, MA *August 10-11*

- Presented a workshop on “Biological Control: What is Worth the Money?” for the NOFA Summer Conference, Hampshire College, Amherst, MA (30 attendees) *August 12*
- Spoke at the CT NOFA Organic Lawn and Turf Course on the topic “Why Organic?” at Wilbur Cross High School, New Haven (70 students in the course) *August 15*
- Gave the talk “Why Organic” to a class taking a course in the NOFA/Mass Organic Lawn and Turf Course in Hanover, MA (65 attendees) *August 17*
- Participated in the Hymenoptera Identification Course, sponsored by the USDA Agricultural Research Service and the Smithsonian Institution, Portal, AZ *September 4-11*
- Spoke at the NOFA/Mass Organic Lawn and Turf Course on the Hymenoptera Identification Course, sponsored by the USDA Agricultural Research Service and the Smithsonian Institution, Portal, AZ *September 4-11*
- Participated in a meeting of the Board of Directors of CT NOFA at Ron’s Raspberries in Durham, CT *September 17*
- Organized a field day at Upper Forty Organic Farm in Cromwell as part of the Brassica Project funded by Northeast SARE. Focus of the field day was on growing summer broccoli *September 24*
- Chaired a meeting of the NOFA Organic Land Care Committee, Valley Laboratory, Windsor *September 26*
- Participated in an advisory meeting to the Quinnipiac River Fund on the most effective ways to reduce water pollution in the Quinnipiac Watershed *October 13*
- Participated in a meeting of the Board of Directors of CT NOFA, Roby’s Organic Farm, Berlin *October 15*
- Met with farmers from 3 organic farms to discuss research on overwintering Brassica and the effect on biological control of pests in the following year *October 16*
- Chaired a meeting of the NOFA Organic Land Care Committee, Valley Laboratory, Windsor *October 24*
- Hosted a Twilight Meeting at Holcomb Farm, West Granby (25 participants) *October 25*
- Presented information on Organic Land Care and Community Farming to the annual meeting of the Connecticut Northeast Organic Farming Association at Jones Auditorium (60 attendees) *November 4*
- Organized and led the annual retreat of the Organic Land Care Committee, a joint program of the Connecticut and Massachusetts chapters of the Northeast Organic Farming Association, Mercy Center, Madison (12 attendees) *December 8-10*
- Participated as co-leader of a meeting of farmers and scientists to discuss the techniques tested and progress made in improving the yield, quality, and profits on *Brassica* crops as part of the project “Achieving High Quality *Brassica* Crops on Diversified Vegetable Farms” funded by the Northeast SARE program, Grafton, Massachusetts (10 attendees) *December 11*
- Spoke about accreditation as an Organic Land Care Professional and about new developments in the Organic Land Care Program at the Organic Land Care Update Course at the Tolland Agricultural Center, Tolland (120 attendees) *December 14*

- Organized and led the annual retreat of the Board of Directors of CT NOFA, Lockwood Cottage, Hamden (12 attendees) *December 16*
- Talked on "Insect Pest Management in Organic Land Care" for the NOFA Organic Land Care Course at the Doyle Environmental Center, Leominster, MA (60 attendees) *January 11, 2007*
- Co-organized and presented the welcome and introduction to the "Getting Started in Organic Farming Conference" in the Jones Auditorium in New Haven (60 attendees) *January 13*
- Participated in a round-table for the organizing meeting of the Connecticut Women's Agricultural Network, Mercy Center, Madison, CT (25 attendees) *January 20*
- Participated in a meeting of the Board of Directors of CT NOFA, Vernon (25 participants) *January 21*
- Chaired a meeting of the Organic Land Care Committee, Valley Laboratory, Windsor (9 participants) *January 23*
- Presented the talk "Organic Management of Insect Pests of Crucifers" and participated in a forum on organic management of insect pests of vegetables at the NOFA-NY Conference, Syracuse, NY (50 participants) *January 26*
- Presented "Introduction to the Organic Land Care Course" and also presented a brief introduction to The Connecticut Agricultural Experiment Station at the NOFA Organic Land Care Course, Jones Auditorium, New Haven (70 attendees) *January 31*
- Presented "Insect Management in Organic Land Care" as part of the CT NOFA Organic Land Care Course, New Haven (60 attendees) *February 5*
- Organized and led the Community Farming Conference at the Mercy Center in Madison (50 attendees) *February 10*
- Met with and advised the bioregional study group on developing an organic vegetable garden and educating others about gardening (10 attendees) *February 17*
- Was interviewed about starting a community farm by Lauresha Xihani of the Waterbury Republican American *February 17*
- Participated in a meeting of the Board of Directors of CT NOFA in New Haven (10 attendees) *February 18*
- Was interviewed about Mexican bean beetles and biological control by Willi Evans Galloway of Organic Gardening *February 21*
- Chaired a meeting of the Organic Land Care Committee in Windsor (12 attendees) *February 27*
- Prepared and led farmers through a demonstration of key insect pests of Brassicas at the regional Brassica School, Sturbridge (30 attendees) *March 6*
- Presented a talk "Biological Control of Insects in Annual Crops" and also presented a poster, "Organic Care of Lawns and Landscapes: Training and Resources" at the first Connecticut Conference on Natural Resources at the University of Connecticut (25 attendees for the talk) *March 9*
- Presented a talk "Managing Good Bugs and Bad Bugs" at the Cultivating an Organic Connecticut Conference in Windsor (55 attendees) *March 10*
- Participated in a meeting of the Board of Directors of Connecticut NOFA at Roby's Organic Farm in Berlin (10 attendees) *March 18*

- Made a presentation on "Community Farming in Connecticut" as part of a Adult Education Course at Cheshire High School (12 attendees) *March 19*
- Was interviewed about starting a community farm by Tiffany Aron of the Meriden Record-Journal *March 20*
- Chaired the Organic Land Care Committee at Windsor (12 attendees) *March 20*
- Participated in the Regional Pesticide Summit at the Toxics Action Conference, Wentworth Institute of Technology, Boston (25 attendees) *March 24*
- Was interviewed about Colony Collapse Disorder in bees by Nancy Crevier of the Newtown Bee *March 30*
- Was interviewed about bees and Colony Collapse Disorder by Rick Green of the Hartford Courant *April 4*
- Was interviewed about honey bees and Colony Collapse Disorder by Patty Gaye of the Weston Forum *April 10*
- Gave a talk to the CT Beekeepers about a new research project studying pesticide contamination of pollen, Jones Auditorium *April 14*
- Participated in a meeting of the Board of Directors of CT NOFA, Manchester *April 15*
- Was interviewed about bees and Colony Collapse Disorder by Anthony Santano of Southern Connecticut State University *April 17*
- Was interviewed about bees and Colony Collapse Disorder by Janice Posada of the Hartford Courant *April 26*
- Was interviewed about bees and Colony Collapse Disorder by Elaine Stahl of the New London Day *May 4*
- Chaired a meeting of the Organic Land Care Committee of the Northeast Organic Farming Association, Valley Laboratory, Windsor *May 15*
- Was interviewed about bees and Colony Collapse Disorder by Darren Hobbs of the Waterford Times *May 25*
- Spoke on current research on bees and pesticide contamination of pollen to the Backyard Beekeeping Association *May 29*
- Participated in a meeting of the Board of Directors of CT NOFA, Old Solar Farm, Oxford *June 3*
- Participated in the 2007 BioBlitz at Wilbur Snow Elementary School in Middletown *June 8-9*
- Gave a presentation on "Managing Good Bugs and Bad Bugs" at the Community Gardening Conference in New Haven *June 16*
- Chaired a meeting of the Organic Land Care Committee of NOFA at the Valley Laboratory, Windsor *June 19*
- Participated in a meeting of the Connecticut Beekeepers at Lockwood Farm, Hamden *June 23*

STUBER, HEIDI

- Manned the Station's exhibit at the 26th Annual Flower and Garden Show at the Connecticut Convention Center, Hartford *February 23, 2007*
- Staffed an exhibit on ticks at Sikorsky in Stratford *April 19*

THOMAS, MICHAEL

- With Dr. Theodore Andreadis, met with State Representative Louis P. Esposito of West Haven and officials from DEP to conduct an on-site inspection of a wood lot in West Haven for potential mosquito habitat *October 11, 2006*

TRENCHARD, PETER

- Manned the Station's exhibit at the CNLA Winter Meeting, Mountainside Resort, Wallingford *January 4, 2007*
- Spoke about Digital Aerial Sketch Mapping at the Forest Health Monitoring Workshop at CAES, New Haven *February 22*
- Manned the Station's exhibit at the Connecticut Flower and Garden Show, Hartford *February 23-24*
- Participated in an "Incident command system full scale exercise at Session Woods Wildlife Management Area, Burlington, CT *March 6-8*
- Set up sound equipment for Agricultural Day at the Capitol *March 21*
- Reported on Connecticut's Nursery Inspection and Survey Activities and presented a talk on Digital Aerial Sketch Mapping for the Horticultural Inspection Society at the 33rd annual meeting of the Eastern Chapter, Horticultural Inspection Society in Jackson, New Hampshire *April 2-5*
- Participated in a Digital Aerial Sketch Mapping Workshop at Northeast Urban Forestry Center, Portsmouth, NH *May 22*
- Displayed honeybees and beekeeping equipment and talked about beekeeping practices to 2nd graders at Second Hill Lane School, Stratford *June 1*

VOSSBRINCK, CHARLES

- Presented a talk on spiders to a 2nd grade class at the Savin Rock Elementary School in West Haven (20 attendees) *December 8, 2006*
- Presented an overview of the CAES molecular research investigations on West Nile virus to Dr. Randy Gaugler and a group of 5 scientists and graduate students from the Center for Vector Biology at Rutgers University *March 2, 2007*
- Presented an overview of the CAES molecular research investigations on West Nile virus to public health and mosquito control officials from Massachusetts (12 attendees) *March 7*
-

WARD, JEFFREY

- Participated in the Connecticut Urban Forest Council Meeting in New Haven *July 18, 2006*
- Assisted the Grove Street Cemetery Association with tree identification *July 18*
- Participated in the Connecticut Tree Protective Association's annual meeting in Farmington *July 20*
- Was the invited guest on WTIC AM-1080 radio talk show "Garden Talk" to offer advice on tree care (35,000 listeners) *July 22*
- Discussed long-term research in Connecticut with visiting faculty from Yale University *August 2*

- Participated in the Connecticut Tree Protective Association's Board of Directors Meeting in New Haven *August 8*
- Spoke on "Current Forest Research" at the Connecticut Forest Health Program Review in New Haven *August 9*
- Chaired a meeting of the Connecticut Forest Council Research Committee Meeting in Middlefield *August 15*
- Participated in a technical review of the USDA Forest Service – Northern Research Station Invasive Species Research Program in Avon *August 30*
- Was interviewed about fall leaf colors by Brigitte Ruthman of the Waterbury Republican *August 31*
- Along with Scott Williams hosted a visit by officials from the Connecticut Transportation Institute to discuss reducing deer-vehicle collisions *September 1*
- Participated in the Connecticut Tree Protective Association Board of Directors meeting in New Haven *September 5*
- Was interviewed about fall color prediction by Amy Parmenter of NBC-30 *September 5*
- Spoke on "Tree Biology" for the Arboriculture 101 class sponsored by The Connecticut Tree Protective Association in Jones Auditorium (44 attendees) *September 6*
- Chaired a CTPA-Education Committee Meeting in New Haven *September 6*
- Was interviewed about fall color prediction by Ed Crowder of the Connecticut Post *September 7*
- Was interviewed about fall color prediction by Bob Miller of the Danbury News Times *September 8*
- Along with Scott Williams spoke on "Ongoing and future Station deer research" to the Fairfield County Municipal Deer Management Alliance in Wilton, CT (12 attendees) *September 11*
- Spoke on "Observations on oak regeneration in Connecticut" at the Ecology and Silviculture of Mixed Oak Forests Session in Brookville, PA (36 attendees) *September 14*
- Was interviewed by Lori Saunders of Public Radio on Forestry Forum *September 18*
- Spoke on "Conservation and use of native shrubs" for the Spring Glen Garden Club at Lockwood Farm (22 attendees) *September 20*
- Was interviewed on the impact of Anthracnose on maple syrup production by Brigitte Ruthman of the Waterbury Republican *September 21*
- Was interviewed on fall colors of sugar maples by Liz Ellis of the Shoreline Times *September 21*
- Was interviewed about fall color development by John Burgeson of the Connecticut Post *September 22*
- Spoke on "Seed Dispersal by Deer" at the Forest Health Cooperators Meeting in New Haven (21 attendees) *September 26*
- Was interviewed about the percent of forest cover in Connecticut by Marian Brown of the Connecticut Post *September 27*

- Organized and hosted the Connecticut Forest Research Forum: From Laboratory to Field, in West Hartford and spoke on "Birch is the future: do not despair" in an afternoon concurrent session (180 attendees) *September 28*
- Was interviewed about the number of leaves in a forest by Steve Busemeyer of the Hartford Courant *October 10*
- Spoke on "Reducing browse damage" to the Durham Garden Club (16 attendees) *October 11*
- Displayed the poster "Japanese barberry (*Berberis thunbergii*) control using propane torches – an organic option" at the CIPWG Invasive Plant Symposium in Wallingford *October 12*
- Was interviewed about late fall colors by Liz Ellis of the Shoreline Times *October 23*
- With Scott C. Williams, visited Aton Forest in Norfolk to advise the Executive Director, John Anderson, Jr., on assessing impacts of deer browse damage *November 1*
- Assisted with an EHAP training workshop sponsored by CTPA in Berlin *November 2*
- Chaired a Connecticut Forestlands Council – Research Committee Meeting in Middlefield *November 2*
- Spoke to Lyman Hall teachers on current research in the Department of Forestry and Horticulture (6 attendees) *November 6*
- Spoke on "Forestry research" at the Second Annual Connecticut Forest Forum in Granby (25 attendees) *November 14*
- Participated in the Connecticut Tree Protective Association, Board of Directors Meeting in New Haven *November 14*
- Spoke on "Forest and Wildlife Research" for the Burnham Brook Preserve Stewardship Committee in Salem (14 attendees) *November 14*
- Met with Jessica Murray of The Nature Conservancy – Weed-It-Now Program to discuss barberry control *November 16*
- Met with Representative George Wilber in Canaan to examine the impact of construction on street trees *November 16*
- Was interviewed about controlling barberry with propane torches by Steve Grant of the Hartford Courant *December 4*
- Was interviewed about whether it is legal to cultivate Ribes by Rich Churchill of People, Places, and Plants Magazine *December 4*
- Was interviewed about the factors influencing the heavy crop of white pine cones by Jan Speigel of the New York Times *December 11*
- Participated in the Connecticut Tree Protective Association, Board of Directors meeting in Southington *December 13*
- Participated in the CNLA Winter Meeting in Wallingford *January 3, 2007*
- Participated in the Invasive Plant Demonstration Project Committee Meeting in Middlefield *January 9*
- Spoke on "Tree Biology" for the Arboriculture 101 class sponsored by The Connecticut Tree Protective Association in Jones Auditorium (47 attendees) *January 10*
- Was interviewed about the impact of the warm winter on trees by Brian Sandie of the Waterbury Republican *January 12*

- Participated in the Connecticut Forestlands Council Meeting in Middlefield *January 16*
- Participated in the Connecticut Urban Forest Council Meeting in Middlefield *January 17*
- Was interviewed about the impact of the warm winter on trees by Shaun Moriarty of the Woodstock Villager *January 17*
- Participated in the 85th Annual Meeting of the Connecticut Tree Protective Association in Plainville *January 18*
- Participated in a Deer-Vehicle Crash Information and Research Center Pooled Fund Meeting in Shoreview, Minnesota *January 28-31*
- Chaired the Connecticut Forest Council Research Committee Meeting in Middlefield *February 7*
- Along with Scott C. Williams, met with ConnDOT officials to discuss deer vehicle collisions (2 attendees) *February 9*
- Participated in the Connecticut Tree Protective Association's Board of Directors meeting in New Britain *February 13*
- Attended the annual meeting of the Yankee Society of American Foresters in Enfield *February 15*
- Spoke on "Barberry control research" at the 12th annual Forest Health Monitoring Workshop in Jones Auditorium (24 attendees) *February 22*
- Spoke on "Barberry control research" at a town meeting in Redding (6 attendees) *February 26*
- Was interviewed about the impact of invasive species on forests by Chris Graef of the New York Times *February 26*
- Spoke on "Influence of Disturbance on Tree Composition in Old-Series Plots" at the Connecticut Conference on Natural Resources in Storrs (50 attendees) *March 9*
- Participated in the Connecticut Tree Protective Association, Board of Directors meeting in Southington *March 13*
- Spoke on "Reducing browse damage in suburban landscapes" for the Menunkatuck Audubon in Guilford (28 attendees) *March 14*
- Hosted "Young Tree Workshop" held at Session Woods in Burlington (67 attendees) *March 15*
- Spoke on "An Overview of Invasive Control Strategies" for DEP staff in Franklin (47 attendees) *March 27*
- Spoke on "An Overview of Invasive Control Strategies" for DEP staff in Burlington (27 attendees) *March 28*
- Participated in the Connecticut Tree Protective Association, Board of Directors meeting in New Haven *April 10*
- Served on the Goodwin Forestry Scholarship Committee in Hartford *April 16*
- Presented posters of forestry and wildlife research at Earth Day at Sikorski (20 attendees) *April 19*
- Spoke on the importance of trees to over 30 students and 8 teachers at the Arbor Day celebration at the state Capitol *April 27*
- Chaired a CTPA-Education Committee Meeting in New Haven *May 2*

- Participated in the Connecticut Tree Protective Association, Board of Directors Meeting in New Haven *May 8*
- Chaired a Connecticut Forest Council-Research Committee Meeting in Middlefield *May 15*
- Spoke on "Japanese Barberry control" at the Natural Resources Council of Connecticut field tour at Lake Gaillard in North Branford (70 attendees) *May 31*
- Spoke on "The natural history of trees" for 2 4th grade classes in Southington 50 attendees – 46 students and 4 teachers) *June 1*
- Offered advice on tree management as an invited guest on WTIC AM-1080 radio talk show "Garden Talk" (35,000 audience) *June 2*
- Was interviewed about Arbor Day and tree care by Brucie Izard of Life Publication *June 2*
- Was interviewed about wild blueberries and huckleberries by Steve Grant of the Hartford Courant *June 5*
- Administered practical and oral examination to arborist candidates for the Connecticut Tree Protection Examining Board *June 12*
- Hosted a field tour of the barberry control study for officials from the Connecticut Department of Public Health in Redding *June 14*
- Participated in the Connecticut Tree Protective Association, Board of Directors' meeting in Farmington *June 18*
- Was interviewed about barberry control by Steve Grant of the Hartford Courant *June 29*

WHITE, JASON
- Discussed the potential employment/volunteer positions for disabled veterans with an official from the U.S. Department of Veterans Affairs *July 17, 2006*
- Participated in an EPA sponsored conference call as a member of the Executive Committee to finalize the formation of the International Society of Phytotechnologies *August 29*
- Met with staff members from Representative Robert Simmons and Congresswoman Rosa DeLauro's offices and briefed them on the work being done in the Aquatic Weed Program *September 6*
- Hosted staff from the USDA ARS Invasive Plant Research Laboratory to work on a collaboration on a project investigating the presence of microbial pathogens on Cabomba populations in Connecticut *September 11-19*
- Presented a Lunch Club seminar with Dr. Joseph Pignatello entitled "Getting the scientific grant: What me worry?" *October 11*
- Chaired the Phytoremediation session at the 21st Annual International Conference on Soils, Sediments and Water, at the University of Massachusetts, Amherst *October 17*
- Participated in EPA sponsored conference call that focused on the formation of a new society called The International Society of Phytotechnologies and on the upcoming first annual meeting in Denver *January 12, 2007*
- Met with officials from USDA CSREES concerning the CAES Invasive Weed Program *January 25*

- Presented CAES phytoremediation research to Robert Araujo and Susan Hitchcock of Sikorsky Corporation *March 14*
- Met with officials from FirstLight Power Resources concerning a research proposal to monitor invasive aquatic species in Lakes Candlewood, Zoar, and Lillinonah *March 29*
- Participated in an EPA sponsored conference call on the upcoming meeting of the International Phytotechnologies Society for which he is serving on the Organizing Committee *May 25*

WILLIAMS, SCOTT
- Spoke to students from Common Ground High School at Lockwood Farm about Station research and professional development (17 students) *July 27, 2006*
- Spoke on "Seed Dispersal by Deer" at the Connecticut Forest Health Program Review in New Haven *August 9*
- Along with Dr. Jeffrey Ward met with officials from the Connecticut Transportation Institute to discuss reducing deer-vehicle collisions *September 1*
- Along with Dr. Jeffrey Ward spoke on "Ongoing and future Station deer research" to the Fairfield County Municipal Deer Management Alliance in Wilton, CT (12 attendees) *September 11*
- Spoke to members of the Nursery and Landscape Association at the Valley Laboratory about ongoing deer repellent studies (60 attendees) *September 19*
- Displayed a poster explaining the role of deer as seed dispersers at the Durham Fair *September 23*
- Spoke on "Seed dispersal by white-tailed deer" at the Forest Research Forum in West Hartford (180 attendees) *September 28*
- Presented research poster "Deer as seed dispersal agents" at the Invasive Plants Working Group meeting in Wallingford *October 12*
- Was interviewed about deer as seed dispersal agents by Lauren Klein of the Norwalk Advocate *November 17*
- Was interviewed about deer as native and exotic seed dispersal agents by Laurie Sanders of National Public Radio's "Field Notes" *November 27*
- Spoke on "Deer-Vehicle Collisions" for state and town officials of the Connecticut Transportation Institute at DOT Headquarters, Newington, Connecticut (25 attendees) *December 13*
- Discussed deer browse damage and forest regeneration with an official from the Norcross Wildlife Sanctuary in Stafford *January 23, 2007*
- Presented an invited lecture "Exotic Seed Dispersal by White-tailed Deer in Connecticut" at the Annual Meeting of the Invasive Plant Council of New York State (50 attendees) *February 7*
- With Dr. Jeffrey Ward met with ConnDOT officials to discuss deer vehicle collisions (2 attendees) *February 9*
- Worked with Girl Scout Emily Pepe of Wallingford to learn about white-tailed deer research and invasive plants to help her earn her Wildlife Interest Project Award toward her Gold Award (Eagle Scout Equivalent) *February 23*

- Served as GIS/GPS Officer during Incident Command Training Full Scale Exercise (FY2007-2 Emerald Ash Borer) in Burlington *March 5-7*
- Met with officials from The Nature Conservancy, Highstead Arboretum and Aquarion Water Company to discuss Japanese barberry removal strategies and white-tailed deer research *March 22*
- Hosted a booth about Connecticut's white-tailed deer herd and other wildlife species at Science Night at Melissa Jones Elementary School, North Guilford (60 children and 50 adult attendees) *March 30*
- Gave an invited talk "Deer as seed dispersal agents" at the State of Vermont Department of Forests, Parks, and Recreation's Forest Health Workshop, White River Junction, VT (109 attendees) *April 5*
- Presented posters of forestry and wildlife research at Earth Day at Sikorski (20 attendees) *April 19*
- Participated in the 63rd Annual Northeast Fish and Wildlife Conference, Mystic *April 23*
- Was interviewed about prescribed fire for control of the invasive exotic Japanese barberry and its potential effects in limiting native regeneration and increased tick dens by Brad Drazen of NBC-30 *April 24*
- Gave a talk on conflicts with pets and coyotes, fishers, and foxes at Paws By the Green pet shop in Guilford, CT (15 attendees) *May 22*
- Spoke on "White-tailed deer research" at the Natural Resources Council of Connecticut field tour at Lake Gaillard in North Branford (70 attendees) *May 31*
- Conducted a natural resources inventory for the Guilford Land Conservation Trust *June 12*

ADVANCES IN KNOWLEDGE

DEPARTMENT OF ANALYTICAL CHEMISTRY

In the interest of focusing succinctly on the Department of Analytical Chemistry and its work over the twelve months from July 2006 through June 2007, the format of this section has been altered from that of previous years. Narrative will be intentionally brief, while salient issues will be presented in bulleted outlines. When available, sources of more detailed information are provided. It is hoped that this revised format will be more readable and ultimately more useful to our constituents.

FOCUS AREAS

Service, research, and outreach work in the Department are conducted across three Focus Areas:

- Environmental Monitoring
- Food Safety
- Natural Products

Service and research activities in each focus area are often mutually complimentary.

SERVICE ACTIVITIES

Routine and non-routine analyses are conducted on a very broad spectrum of sample matrices submitted by other State of Connecticut agencies, municipal agencies, police departments, non-profit groups, and Connecticut businesses, a list not intended to be all-inclusive.

Analyses on behalf of DEPARTMENT OF AGRICULTURE

1. *Feeds:*
    - Analysts: Craig Musante, Mamie Pyles, David Stilwell, John Ranciato
    - Goal: assure products are in compliance with stated label guarantees
    - Analyses which served as the rationale for Station's establishment in 1875.
    - Sample type: products for both household pets and commercial agricultural operations.
    - Samples collected by the Connecticut Department of Agriculture.
    - Analytical results reported to Connecticut Department of Agriculture, product manufacturer, product dealer.
    - From 1 July 2006 to 30 June 2007 completed analysis of 82 samples for parameters such as protein, fat, moisture, and fiber. Deficient samples (based on analytical variations specified in the Official Publication of the Association of American Feed Control Officials) totaled 29 (35.4%).

2. *Fertilizers:*
    - Craig Musante, Mamie Pyles, David Stilwell, John Ranciato
    - Goal: assure products are in compliance with stated label guarantees
    - Analyses serving as basis of Station's establishment in 1875.
    - Sample type: products for both residential and commercial agricultural operations.

- Samples collected by the Connecticut Department of Agriculture.
- Analytical results reported to Connecticut Department of Agriculture, product manufacturer, product dealer.
- From 1 July 2006 to 30 June 2007 completed analysis of 132 samples for macronutrients, such as nitrogen, available phosphoric acid, and potash, and for micronutrients, including but not limited to, boron, sulfur, cobalt, magnesium, and iron. Deficient samples (determined according to the investigational allowances outlined in the Official Publication of the Association of American Plant Food Control Officials) numbered 47 (35.6%).

3. *Analysis of flavored milk from school cafeterias*
   - Analysts: Brian Eitzer, Walter Krol, Craig Musante
   - Background: children at two elementary schools in southeastern Connecticut became ill after consuming strawberry- or chocolate-flavored milk at lunch on 28 March 2007.
   - CAES contacted by Commissioner of Agriculture on 28 March requesting analytical assistance. Further discussions between Dr. Mattina at CAES with the Department of Agriculture and with product bottler resulted in analytical standards acquired by Dr. Mattina on 28 March.
   - Sixteen ½ pint cartons of milk collected from school cafeterias and delivered to laboratory by inspector from Connecticut Department of Agriculture on 29 March 2007.
   - Analysis within four hours of sample receipt confirmed that four cartons contained sanitizer (0.3% to 0.6% by volume) used to flush filling lines at dairy plant.
   - Analysis of authentic sanitizer submitted by dairy showed it to contain nonanoic, decanoic, as well as well as nitric and phosphoric acids.
   - Complete analytical report provided to Department of Agriculture.

⇐ Sample of normal chocolate-flavored milk

Sample of sanitizer-tainted ⇒ "chocolate" milk

IMPACT: These findings resulted in a prompt, voluntary recall of milk products and corrective actions in the dairy plant. There was an immediate impact on public health through the prevention of additional illnesses. Moreover, the success in identifying adulteration of beverages demonstrated that analytical chemists are extremely well prepared to meet the challenges of counter terrorist activities associated with the US FDA program, the Food Emergency Response Network.

Analyses on behalf of DEPARTMENT OF CONSUMER PROTECTION, FOOD and STANDARDS DIVISION

1. *Pesticide residues in food:*
   - Analysts: Walter Krol, Terri Arsenault, Brian Eitzer
   - Goal: determine concentration of agrochemicals in fresh and processed foods from local, domestic, and imported sources offered for sale in Connecticut to assure compliance with regulations.
   - Market basket survey samples collected by Inspector Ellen Sloan of the Connecticut Department of Consumer Protection (DCP).
   - Results published in annual Station bulletin available by mail and at www.ct.gov/caes
   - From 1 January 2006 to 31 December 2006 (dates to coincide with Station bulletin) we analyzed 181 samples including 140 (77.3%) fresh foods and 41 (22.7%) processed foods.
   - Compared results for all 181 samples from two different extraction and detection methods, referred to as "VegPrep" and "QuECHERS."
     - ❖ VegPrep method, developed by Station chemist, in use since 1988 at the Connecticut Agricultural Experiment Station, includes organic solvent extraction followed by analysis of agrochemicals via gas chromatography interfaced to electron capture and mass spectral detectors.
     - ❖ QuECHERS method, recently developed at USDA, less labor and solvent intensive, includes analysis of agrochemicals via gas and liquid chromatography with mass spectral detectors.
   - Comparison of two methods shows that QuECHERS provides lower limits of detection and increased number of detectable agrochemicals. See RESEARCH section below and Station bulletin for details.
   - Results
     - ❖ VegPrep: (i) 133 different pesticides detected
       (ii) no pesticide residues in 98 samples (54.1%)
       (iii) non-violative residues in 79 samples (57.1%)
       (iv) violative residues in 4 samples (2.2%)
       Above data comparable to that from preceding years' studies
     - ❖ QuECHERS: (i) 180 different pesticides detected
       (ii) no pesticide residues in 73 samples (40.3%)
       (iii) non-violative residues in 89 samples (49.2%)
       (iv) violative residues in 19 samples (10.5%)
   - Data highlights
     - ❖ low but violative residues of atrazine found in QuECHERS extracts of leafy green vegetables using liquid chromatography/mass spectrometry (LC/MS). US Environmental Protection Agency presently adjusting tolerances based on CAES data.
     - ❖ violative residues of chlorothalonil on 4 separate samples of snow peas imported from Guatemala; data reported to FDA.
   - Beginning in 2007 all market basket samples will be extracted and analyzed with QuECHERS protocols.

IMPACT: These findings resulted in immediate benefits. The QuECHERS method implemented in our laboratory results in the consumption of considerably less organic solvent and, therefore, produces much less organic solvent waste, with economic and environmental benefits. In addition with the laboratory's ability to analyze for a greatly expanded list of agrochemicals, the public is reassured that fresh and processed food remains safe to consume.

2. Bottled water samples from vending machine at UCONN Storrs campus

- Analyst: Brian Eitzer
- Background: Dr. Mattina contacted late afternoon on 25 May by Consumer Protection inspector relating that water purchased from campus vending machine at UCONN Storrs allegedly resulted in burning sensation when consumed. Although no illness was reported, campus police at UCONN Storrs impounded vending machine.
- One partially consumed sample and two sealed samples from vending machine delivered to CAES laboratory the morning of 29 May.
- Within hours of sample receipt, analysis showed no difference between suspect and comparison samples for pH, heavy metal content, volatile organic compounds. Very low parts per billion amounts of hydrocarbons were detected at similar levels in suspect and comparison samples. Results were transmitted to Connecticut DCP for further action.

3. Fat content in ground meat

- Analyst: Craig Musante
- Goal: ascertain that percentage fat is consistent with product label
- Comment: reinstitution in 2007 of testing program following hiatus of several years.
- Since 1 January 2007 sixteen products have been submitted and analyzed. Label claim for one product was inconsistent with laboratory analysis.

4. Miscellaneous samples

- Analyst: Mamie Pyles and department staff
- From 1 July 2006 to 30 June 2007, 201 samples submitted for variety of analytical requests such as identification of foreign material, possible product adulteration or tampering. For some samples we rely on the expertise of Station staff in other departments.
- Highlighted sample: bottled water from consumer containing small, blue-colored debris submitted to laboratory, along with medications from consumer's home. Sample submitted in early afternoon, by late afternoon Brian Eitzer identified blue debris as principal ingredient in one of the submitted medications. The conclusion was reached that no product tampering had occurred; the consumer himself had inadvertently contaminated the product.

Analyses on behalf of DEPARTMENT OF CONSUMER PROTECTION, LIQUOR CONTROL DIVISION

1. Beverages for ethanol content

- Analyst: John Ranciato
- Goal: provide % ethanol by volume for label registration and taxation purposes
- Analyzed 74 products such as beers, wines, liquors for ethanol.

Analyses on behalf of DEPARTMENT OF CONSUMER PROTECTION, PRODUCT SAFETY DIVISION

1. Miscellaneous samples

- Analyst: Craig Musante and department staff
- From 1 July 2006 to 30 June 2007, 14 samples were submitted. Most were imported, painted toys for lead content. Results for two samples exceeded the 600ppm level considered acceptable with recall of unacceptable toys issued by state agencies.

IMPACT: The results indicate that vigilance remains of paramount importance in surveying the safety of consumer products. This is particularly true of toys intended for infants and children. The negative consequences of chronic lead consumption on childhood development have been potentially avoided through our rapid analyses and reporting thereof. Response of the caliber which our chemists demonstrate is also critical in cases of intentional contamination or terrorist activities with acute impacts on public health.

Analyses on behalf of DEPARTMENT OF ENVIRONMENTAL PROTECTION, WASTE MANAGEMENT BUREAU

1. PCBs (polychlorinated biphenyls) and pesticides

- Analysts: Brian Eitzer, William Berger, Terri Arsenault
- Goals: ascertain extent of PCB contamination associated with breached electrical transformers; ascertain pesticide concentration associated with misapplication or drift in support of Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
- Matrices include, but are not limited to soils, sediments, foliage, surface wipes, fabric, air
- From 1 July 2006 to 30 June 2007 total of 153 samples were analyzed of which 50 were PCB analyses. Data reported by us guide site remediation conducted by other state agencies.

Analyses on behalf of MUNICIPAL and FEDERAL AGENCIES

1. Plastic beverage containers

- On 24 August 2006 punctured orange juice container (see orange-capped container on right of photo below) purchased by New Britain police officer was delivered to CAES laboratory by Connecticut Department of Consumer Protection. Puncture in lid was considered possible product tampering.
- Within two hours analyses indicated that product did not contain toxins and that puncture was not consistent with use of syringe needle.

- On 25 August 2006 punctured milk container (see red-capped container on left of photo below) from consumer was delivered to CAES laboratory by CT Department of Agriculture, Bureau of Regulation and Inspection.
- Within an hour we determined that puncture location and shape were consistent with that observed the previous day on orange juice container.
- Conclusion: both products were bottled on the same faulty process line at a plant in Massachusetts. No product tampering was involved and no product recall was necessary.

square shaped opening in milk container

square shaped opening in orange juice container

2. Analysis of fertilizer spikes for USDA

- Analyst: Craig Musante
- We were requested to conduct analysis of four fertilizer spikes submitted by US Department of Agriculture.

3. Analysis of samples from Food Emergency Response Network (FERN)

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Craig Musante, Christina Robb
- As participants of FERN as a chemistry laboratory we analyzed 17 food samples for toxins. Included was wide range of fresh and processed matrices.
- As recipients of Cooperative Agreement funds we analyzed 24 samples related to melamine adulteration of pet foods. Samples included soy-based products, corn products, and other grain products. We were required to provide a 48 hour turn-around time from receipt of sample to data reporting, which we achieved for all samples.
- Additional FERN-related information is provided in the RESEARCH section below.

Analyses on behalf of other STATION DEPARTMENTS

1. Community garden soils from Valley Laboratory, Soil&Water, and others

- Analysts: David Stilwell, Craig Musante, John Ranciato
- 49 samples from different community garden sites across Connecticut analyzed for heavy metals.
- See details on collaborative project proposed in RESEARCH section.

2. Soils from state nursery site in Griswold from Dr. Magnarelli

- Analysts: Craig Musante, Terri Arsenault

- Site under consideration for transfer of property from the Connecticut Department of Environmental Protection to CAES oversight for research purposes.
- 20 soil samples analyzed for heavy metals and agrochemicals. None exceeded levels of concern.

3. Analyses related to pollinator decline for Department of Entomology

- Analyst: Brian Eitzer
- Request from Dr. Kim Stoner in Entomology to determine concentrations of agrochemicals in pollen and wax to ascertain possible relationship to bee health.
- LC/MS methods being developed for low level detection of pesticides.

4. Analyses to detect fungal mycotoxins in indoor air for Valley Laboratory

- Analyst: Brian Eitzer
- Request from Dr. DeWei Lei at Valley Laboratory to determine patterns of mycotoxins in confined air.
- LC/MS methods being developed.

5. Analysis of bromine isotopes in seawater

- Analyst: David Stilwell
- Request from Dr. J. Pignatello in Department of Soil&Water to determine bromine isotopes in seawater.
- Preliminary results using inductively coupled plasma/mass spectrometry (ICP/MS) indicates that low levels of detection are achievable.

6. Analysis of rainwater runoff from Lockwood Farm barns for Dr. Magnarelli

- Analysts: Terri Arsenault and Craig Musante
- Prior to collection of rainwater from roof runoff for irrigation uses, Dr. Magnarelli requested analysis of four samples from different sites to assure its suitability.
- No contamination of runoff water was found.

ANALYSES OF CHECK SAMPLES

- Annual performance evaluation samples required by our certifying agency, Connecticut Department of Public Health.
- Southern States Check Sample program to monitor the reliability of our analyses related to the market basket survey.
- Annual proficiency testing samples related to FERN work.

RESEARCH ACTIVITIES

I. FOOD SAFETY

- Project: *Comparison of Two Methods for Determination of Pesticide Residues in Food Samples*
- Investigators: Terri Arsenault, Brian Eitzer, Walter Krol
- Summary: Extensive comparison of previous extraction method, the VegPrep, with the Quick, Easy, Cheap, Effective, Rugged, Safe (QuEChERS) method. Details will be

presented to analysts at the Florida Pesticide Residue Workshop in July 2007, in a Station bulletin, and in a planned manuscript.

- Project: *Validation of FERN methods*
- Investigators: Terri Arsenault, Brian Eitzer, Christina Robb, Craig Musante
- Summary: Integral to our Cooperative Agreement with the FDA is assessment of various FERN procedures for detecting toxins in foods. We determined that some modification of extraction solvents provides better detection of certain toxins in a variety of food matrixes.

II. ENVIRONMENTAL MONITORING

- Project: *Mechanisms of Uptake by Terrestrial Plants of Legacy Pesticides from Soil*
- Investigators: MaryJane Incorvia Mattina, William Berger
- Introduction: This project is a prime example of the overlap of service and research activities in the Department of Analytical Chemistry. In 1990 samples from our market basket survey were found to contain chlordane residues, although the registration for this insecticide on food crops had long been terminated. Our research and that from other groups has shown that some agrochemicals have measured half-lives in soil of years, decades, and, unbelievably, centuries in some instances. Back in 1990 we noted that not all the crops from this Connecticut organic farm contained the residues, and this observation has sustained the line of inquiry that we have pursued over the years.
- What is unique about *Cucurbita pepo*? We are not the only laboratory to report that *C. pepo* plants (zucchini) have a remarkable ability to uptake highly weathered residues of organochlorine compounds, including chlordane, DDT, and dioxins, from soil. Data from grafting experiments in our latest publication (MaryJane Incorvia Mattina, William A. Berger, Brian D. Eitzer "Factors Affecting the Phytoaccumulation of Weathered, Soil-borne Organic Contaminants: Analyses at the ex Planta and in Planta sides of the plant root" *Plant and Soil* doi 10.1007/s11104-006-9182-4 (2007)) prove that root physiology is the foundation of C. pepo's unique phytoaccumulation properties.
- Research tie-in with phytoremediation: Phytoremediation remains a long-term goal for the treatment of soil contaminated with organic pollutants as it has the potential to be a less expensive *in-situ* treatment process. We have recently found that *Arabadopsis thalinia* can translocate POPs from soil to aerial tissue. This species is very well characterized genetically. It is, therefore, hoped that by studying the uptake of pollutants by different ecotypes of this species we can learn which genes are important in the uptake of pollutant chemicals. This in turn could lead to enhancements in the ability of plants to uptake and translocate pollutants, which could subsequently make phytoremediation a truly viable alternative for the treatment of contaminated soil.

- Project: *Heavy Metals in Community Garden Soils:*
- Investigators: David Stilwell, Craig Musante, John Ranciato
- Summary: On-going program on environmental impacts of lead (Pb) and other heavy metals in community garden soils and plants. Over this reporting period we acquired 54 composite samples from 9 community gardens in 5 Connecticut cities. The results for Pb ranged from <20 to 558 mg/kg, and for arsenic (As) they ranged from 2 to 25 mg/kg. Of

the native soil in seven gardens, 5 of them (71%) had at least one sample exceeding the 400 mg/kg limit for Pb, or the 10 mg/kg limit for As. Based on these data the gardening public is assured that contaminated soils have been identified and appropriate remediation action may be effected. Ongoing surveys of this type are appropriate throughout Connecticut.

- We found that the mobility of lead in these soils decreased with increasing phosphorus content. This year we continued with these mobility experiments by adding 3 types of phosphorus (P) soil amendments at concentrations of 1000 and 5000 mg/kg P, to 8 garden soils with Pb contents ranging from 30 to 8000 mg/kg. The three P amendments were, in increasing order of solubility, rock phosphate (tri-calcium di-phosphate), triple super phosphate (calcium dihydrogenphosphate), and monobasic sodium phosphate. After ageing for two months the heavy metal and phosphorus content was determined in extracts. In general, when the soil P was in excess of 1000 ppm, no further lowering in Pb in the extracts was noted, and as the P levels increased the As levels in the extracts increased. The P in the extracts were much lower in rock phosphate amended soils, suggesting that this amendment worked best since P in rainwater runoff can be harmful to streams and lakes. Though soil ingestion is expected to be the major source of exposure in contaminated gardens, consumption of plants grown in these soils is also important to consider.
- We now have a sensitive instrument (ICP/MS), which allows us to determine heavy metals at levels at least an order of magnitude lower than our previous detection limits. In this year's trial we compared the heavy metal content in 16 plant samples taken from 4 community garden sites to 10 store-bought samples, including lettuce, broccoli, collards, and bell peppers. Arsenic and lead were elevated in the garden grown plant samples. For example, the average lead content was 624±902 µg/kg (ppb, dry weight basis) in the garden produce versus 33±26 in store bought produce, while the arsenic averaged 107±72 ppb in the community garden produce and 71±42 in the store bought samples. These levels did not, however, exceed international limits for lead (3000-16000) or arsenic (5000-20000). Cadmium and thallium were found in produce from both sources.

III. NATURAL PRODUCTS

- Project: *Oilseed Crops as Potential Sources of Biofuels in Connecticut*
- Investigators: Walter Krol, Christina Robb
- Summary: preliminary research has been conducted in collaboration with Dr. James LaMondia at the Valley Laboratory to evaluate cultivation and yield of rapeseed and soybeans as rotational crops or winter cover crops in Connecticut. Conversion of the oil pressed from the seed and its conversion to biodiesel is being analyzed for quality.
- Assistance has been provided to several producers of biodiesel to improve processes.

PUBLIC OUTREACH

- *Analyses in support of research by Yale students:* inquiries were received by Dr. Mattina from two graduate students at Yale University's School of Forestry and Environmental Studies for assistance with their research projects.

- ❖ Walter Krol assisted Beth Feingold to determine organic pollutants in local rivers using GC/MS. Minimal pollution was found.
- ❖ Brian Eitzer worked with Sean Johnson to determine agrochemicals in water from Costa Rica using LC/MS. Very little pollution was detected.

- *19 April Open House:* The focus of the program was "Biofuels for Connecticut." Drs. Mattina, Krol, and LaMondia presented talks and demonstrations followed by tours of the laboratories and greenhouses. Representatives from industry and from the University of Connecticut were in attendance.

- *Telephone/internet inquiries*: We receive frequent calls from the public requesting information on issues such as pesticides in food and in the environment, lead in paint, food, soils, and consumer products. In some instances we refer the caller to a more appropriate Station Department or State agency. We typically handle over 1000 such inquiries each year. As more persons gain access to the Internet, inquiries are coming from beyond Connecticut.

- *Station Bulletins*: Station Bulletins are typically published annually by our Department. These bulletins are available in printed form and on the Station's web site (WWW.CT.GOV/CAES). They are also available at libraries throughout Connecticut.

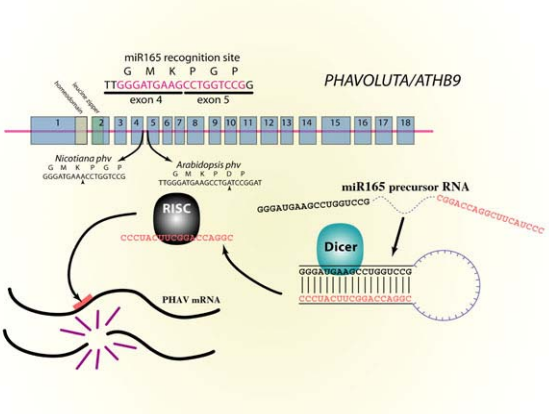
- *Fact Sheets*: Listed on the Station's web site under "Publications" are several articles written for the general public regarding topics of timely and widespread interest. These are also available in printed format. Department members also cooperate with the Connecticut Department of Public Health in producing fact sheets published by them.

- *New Haven Sound School*: Two members of our Department, Drs. David Stilwell and Brian Eitzer, serve on the advisory council of New Haven Public School's Sound School.

- *Department of Analytical Chemistry brochure:* Dr. Mattina has prepared a brochure describing the work done in our department for distribution to visitors and anyone interested in our activities.

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

Leaf and Flower Development:
Dr. Neil McHale in collaboration with Dr. Ross Koning (Eastern CT State University) and with technical assistance from Regan Huntley, continued work on regulation of plant development by microRNA molecules. These microRNAs induce gene silencing by targeting specific mRNA



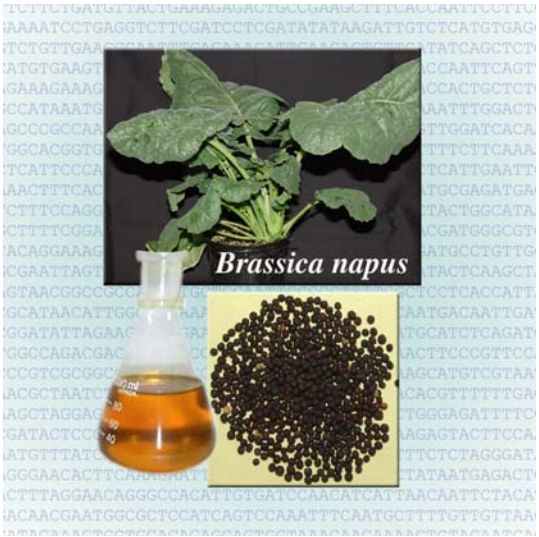
molecules for destruction by a RISC ribonuclease complex. MicroRNAs are active only in certain locations, creating specific on/off boundaries for gene expression that guide organ development. Our main focus has been the family of HD-ZIPIII transcription factors regulated by miR165/166. Our earlier results confirmed the central role of this system in leaf development. More recent work shows it is equally critical in flowers, particularly for the enclosure of developing ovules within the carpels of developing fruit. In our phv1 mutation abolishing microRNA regulation of the HD-ZIPIII gene PHAVOLUTA (NsPHAV), the outer wall of the carpel produces a network of adaxial structures including ectopic placenta with exposed ovules. How would ectopic expression of *PHAV* produce this response? One hypothesis based on recent work in Arabidopsis was that ectopic *PHAV* is inducing ectopic activity of a MYB family transcription factor called PHANTASTICA (NsPHAN), which we know to be a key component in specification of adaxial identity. The testable prediction in that case is that *NsPHAN* function would be required for *phv1* mediated adaxialization. To address this, we introduced the *phv1* mutation into an antisense *NsPHAN* (*AF18B*) background, and in fact observed that this suppresses the *phv1* carpel phenotype. Loss of *NsPHAN* not only blocks formation of ectopic adaxial tissue, but restores formation of a functional style and stigma. The only evidence of a *phv1* phenotype in *AF phv1* double mutants is occasional formation of ectopic stylar tissue. This observation indicates that the HD-ZIPIII genes are master regulators of adaxial identity in leaves and flowers, and that they operate upstream and in the same developmental pathway as NsPHAN.

Impact

Genes controlling patterns of plant development have been used extensively by plant breeders to produce improved varieties of crop plants. Alterations in growth habit and flowering patterns are examples of developmental changes with direct applications in agriculture. Our work has influenced the direction of investigations in many other research laboratories. The most recent example is a new project headed by Dr. Jun-Yi Yang in the Plant Molecular Biology program at Rockefeller University involving one of our transgenic strains of *Nicotiana sylvestris*.

Seed Storage Oils from Brassica:

Oils extracted from the seeds of Brassica species have excellent culinary qualities and are also used in production of biodiesel fuel, an attractive new prospect for renewable energy from agricultural plants. Canola oil comes from *Brassica napus*, a species also used as a cover crop, because the leaves and stems contain a variety of glucosinolates that suppresses the activity of nematodes and fungi in the soil. Taking advantage of a fully sequenced genome in a closely related model plant (*Arabidopsis thaliana*), **Dr. Neil McHale** has initiated molecular approaches to manipulation of glucosinolate



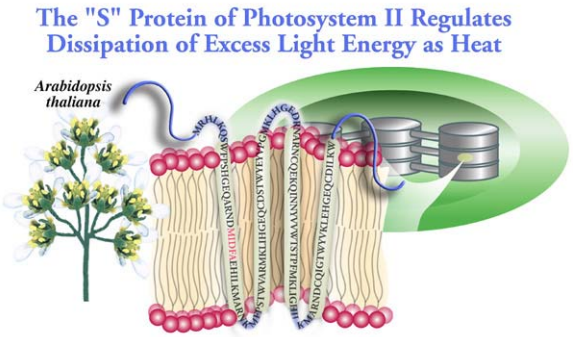
profiles in *B. napus*. Genes regulating their biosynthesis from methionine and tryptophan precursors have been isolated, along with other genes that mediate side chain alterations. Together with Jim LaMondia, Walter Krol, and Christina Robb, our objective is to silence or overexpress these genes in transgenic plants, confirm the altered glucosinolate profiles by HPLC, and determine which are most active in suppression of nematodes in CT soils.

Impact

The main impact of this work will be on biological approaches to management of pest populations in CT soils. CT farmers currently have no alternative to chemical fumigation for control of parasitic nematodes in the soil. Brassica napus strains engineered to suppress nematodes would be an economical and environmentally sound alternative.

Genetic Dissection of Photoprotection in Leaves:

Dr. Richard Peterson in collaboration with **Dr. Neil Schultes** and assisted by Carol Clark continued work on the mechanisms governing carotenoid-dependent thermal dissipation of excess light energy in higher plant photosynthetic systems. MicroRNA-based gene silencing is a rapidly emerging functional genomics tool for a wide range of eukaryotes. As a basis for broader application of virus-induced gene silencing (VIGS) to photosynthesis research, we employed a tobacco rattle virus (TRV) vector system introduced by Agrobacterium-mediated infiltration to silence expression of the nuclear *psbS* gene in *Nicotiana benthamiana*. The 22-kiloDalton psbS protein is essential for xanthophyll- and H^+-dependent thermal dissipation in higher plants widely known as nonphotochemical quenching (NPQ). Effects of deletion of *psbS* in *Arabidopsis thaliana* have been well documented. Controls treated with the TRV-VIGS vector containing a bacterial chloramphenicol resistance gene as the silencing target were included to test for non-silencing effects of the viral vector system. PsbS protein was undetectable and both *psbS* mRNA transcript levels and NPQ capacity were dramatically reduced in new leaves of VIGS-*psbS* plants only. Photosynthetic capacity was measured by CO_2 exchange at different irradiance levels and gas phase compositions in TRV-VIGS-treated and uninfiltrated plants. Light utilization in PSII was monitored by Chl fluorescence. An innovative aspect of this work was application of a redox equilibrium-based model of the donor side electron carriers to deconvolute the *in vivo* absorption signal at 810 nm and assess reaction center density, electron transport, and energy utilization in PSI. TRV-VIGS caused a mild stress based on pigment content and light absorption characteristics. Nevertheless, rates of CO_2 assimilation were somewhat enhanced by TRV-VIGS at saturating irradiances. More importantly, TRV-VIGS did not significantly alter H^+-dependent regulation of light utilization in PSII and PSI. In addition to Dr. Schultes, this work was performed in



collaboration with Dr. Agu Laisk and colleagues of the Department of Cell and Molecular Biology, University of Tartu, Estonia.

The mechanism of action of psbS leading to expression of the rapid phase of NPQ (i.e., qE) remains an elusive quest. As a fundamental step toward understanding the role of psbS in qE, the relationship between *in vivo* psbS level and the amplitude of the qE phase were examined in normal as well as psbS overexpressor lines of Arabidopsis. Despite a ten-fold variation in leaf psbS level the correlation with qE was surprisingly poor. Nevertheless, analyses of pigment levels in these leaves was crucial to improved prediction of qE levels. Specifically, a highly linear relationship was observed between the product of psbS level and the amount of the mono-epoxide xanthophyll pigment antheraxanthin. Current information suggests that this is a "broken order" process implying complexity in the reaction mechanism. These results will aid in interpretation of the role of carotenoid excited states in the qE mechanism in collaboration with Dr. Harry Frank of the Department of Chemistry, University of Connecticut. Furthermore, this is an important step toward forming a basis for quantitative evaluation of effects of discreet structural alterations to psbS. We have already made considerable progress in developing a transient expression system for introduction of structural variants of psbS following suppression of expression of the endogenous gene by virus-induced gene silencing.

Impact
The main impact of this work will be development of crop plants able to withstand environmental stress. When water supply is limiting, the photosynthetic apparatus can be damaged irreparably by continuous exposure to sunlight. Genes under investigation here are critical to protecting plants from this damage. Our work has had a direct influence on the course of related ongoing work in the labs of Dr. Agu Laisk, Department of Cell and Molecular Biology, University of Tartu, Estonia and Dr. Harry Frank of the Department of Chemistry, University of Connecticut.

Photo-protective Mechanisms in Plants
Dr. Neil Schultes continued his collaboration with **Dr. Richard Peterson** on light utilization and photo-protection in plants. During photosynthesis plants transform energy from sun light into chemical energy as sugars and starch. Adverse environmental conditions, particularly water deficit, result in physiological stress in plants that diminish photosynthesis and reduce yield. When photosynthesis is curtailed light is still absorbed and now, in excess, can lead to damage. Plants dissipate excess light predominantly through non-photochemical quenching (NPQ), a process mediated by the psbS protein, located in the thylakoid membrane of the chloroplasts. Our aim is to discern the mechanistic role of psbS in NPQ. Our approach is to undertake a structure-function analysis of psbS by generating site-directed mutations, introducing these altered genes into plants and measuring photosynthetic parameters.

Site-directed mutation of pigment binding sites in psbS:
A phylogenetic analysis of the psbS gene database revealed several conserved sites in the psbS protein. One has homology to known pigment binding sites. We used site directed

amino acid alterations that would disrupt pigment binding yet otherwise keep the psbS protein structure intact. Transgenic Arabidopsis lines (devoid of endogenous psbS) which express these altered *psbS* genes were deficient in the qE portion of NPQ. A publication detailing this work appeared in press April 6 of this year. We have also generated similar transgenic Arabidopsis lines which express *psbS* from different environmental and phylogenetic sources, including Nicotiana (a C3 plant), Mesembryanthemum (a CAM plant) and the moss Physcomitrella. The idea is to determine if psbS are interchangeable or are species specific. Analysis of these lines is currently in progress.

A high throughput system for structure-function analysis of psbS:
Our objective is to generate a system to rapidly assay psbS alteration *in planta* and access the stability and crude function of these psbS variants This system uses new virus-induced-gene silencing (VIGS) techniques to generate a transient mutant phenocopy of the psbS gene in *Nicotiana benthamiana* yielding a NPQ deficient plant. The second part of the system is to transiently reintroduce altered psbS and assay protein stability and function. We have successfully introduced and expressed Arabidopsis and *N. benthamiana psbS* genes in silenced tissue via Agrobacterium mediated transient expression. PsbS protein is produced and partial complementation of the NPQ phenotype is restored. Our current aim is to increase the level of functional complementation *in planta* by investigating alternate means of transiently delivering *psbS*. To this end we have engineered Arabidopsis *psbS* into Potato X and Tobacco Mosaic Virus expression systems. During the next year we will transiently infect *psbS* silenced plant tissue and assay psbS production and NPQ complementation.


Nicotiana benthamiana

Genetic alteration of carotenoid levels in planta *through VIGS*
The qE portion of NPQ requires psbS, a low luminal pH and the carotenoids zeaxanthin and violaxanthin. We are using VIGS to deplete zeaxanthin epoxidase (ZE) activity, which controls the conversion of zeaxanthin to antheraxanthin and finally into violaxanthin. Our recent analysis shows that there is a direct relationship between the level of NPQ and the product of psbS and antheraxanthin concentrations. This result is intriguing as it is believed that zeaxanthin (and possibly antheraxanthin) bind to psbS as part of a functional NPQ complex. One way to investigate this correlation is to alter the levels of carotenoids and monitor the effect upon NPQ. Our VIGS suppression of ZE in *N. benthamiana* results in enhanced levels of antheraxanthin. Currently we are analyzing the effect upon NPQ.

Plant Nucleobase Transport
Manipulating plant biochemistry is central to future genetic enhancement of crops for increased yields and more efficient use of fertilizers. Plant biochemistry is in a constant state of flux marked by metabolite exchange within individual cells, between adjacent cells and over long distances throughout the plant. Membrane bound transporters act as gatekeepers regulating this exchange. During the past year my colleague, Dr. Mourad, and I have centered our research on two different transporter families in Arabidopsis - the adenine/guanine-like transporter (AtAzgA) and purine related transporter (PRT) families.

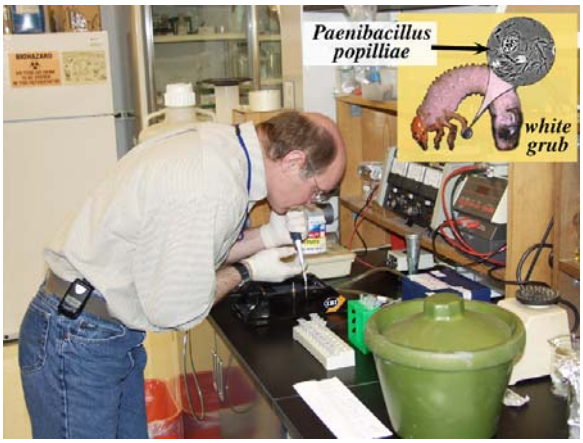
Arabidopsis adenine-guanine-like transporters
Two Arabidopsis loci, At3g10960 and At5g50300, encode for proteins that share amino acid sequence similarity to the adenine-guanine transporter in *Aspergillus nidulans AzgA.* Mutants in *AzgA* locus can grow on 8-azaguanine containing media. Employing a reverse genetic approach, we have obtained independent Arabidopsis T-DNA insertion lines in the At3g10960 and At5g50300 loci. During the past year we used polymerase chair reaction analysis to verify the genotype and generate homozygous mutant lines for each of these loci. These lines were grown on media containing different concentrations of toxic nucleobase analogues, 8-azaguanine, 5-fluorouracil and 5-fluorocytosine. As expected these Arabidopsis lines display resistance to 8-azaguanine but not the other nucleobase anti-metabolites. The data supports the idea that the encoded proteins facilitate the transport of guanine into plant cells. To further investigate the transport function we are using a yeast heterologous system to test guanine uptake. We have placed the full length cDNAs from both At3g10960 and At5g50300 into yeast expression vectors and introduced these constructs into *Saccharomyces cerevisiae* deficient in the ability to transport guanine (*fcy2* mutants) Analysis of these transgenic yeast is ongoing.

Does Arabidopsis locus At5g03555 encode for a uracil/thiamine/uridine transporter?
Computer-assisted amino acid alignment of the protein encoded by Arabidopsis locus At5g03555 reveals substantial homology to prokaryotic and eukaryotic proteins in the Nucleobase Cation symporter 1 family and to the purine transport related transporter family (PRT) in *Saccharomyces cerevisiae*. Transporters in these families are responsible for the movement of uracil, uridine, allantoin, thiamine or cytosine. We have obtained and verified through molecular techniques the genotype of Arabidopsis insertion "knockout" line disrupted in locus At5g03555. Growth studies of this line on 8-azaguanine, 5-fluorouracil and 5-fluorocytosine reveal enhanced resistance on 5-fluorouracil and 8-azaguanine. Similar heterologous transport assays in yeast described above, are underway to determine the transport function of At5g03555.

Impact
The impact of this work will come with the engineering of crop plants that use fertilizer more efficiently. This will lower the production cost per acre for farmers, and help to mitigate the environmental effects of fertilizer runoff from agricultural fields.

Genetic Engineering of Paenibacillus Organisms:
Dr. Douglas W. Dingman, assisted part-time by Cindy Musante, has begun insertional mutagenesis experiments using the transposon Tn916 to construct a library of random

bacterial mutants. Construction of an insertional mutant library for *Paenibacillus larvae*, the cause of American foulbrood in honey bees, has also been initiated. These libraries will provide the molecular tools needed for investigating the pathogenic properties of *Paenibacillus popilliae* and the ability to isolate genes specific to pathogenicity.



Construction of a mutant library for *P. popilliae* was initiated via conjugative transfer between P. *popilliae* strains TC1001 and EM1001. A mutant library for *P. larvae*, was initiated via mating between *P. popilliae* TC1001 (donor) and *P. larvae* NRRL B-3555 (recipient). Following mating, new insertional mutants were isolated and frozen at -80C to stock the 2 libraries. Approximately 2000 mutants have been collected for each library (10,000 mutants to be collected for a complete library) and testing for randomness of transposon insertion into the bacterial genome has been performed. To test for randomness of transposon insertion in the genome, genomic DNA was isolated from approximately 30 selected isolates from within each library. Southern hybridization analysis (using a radio-labeled Tn916 hybridization probe and HincII digested genomic DNA) performed for the *P. larvae* library demonstrated randomness of insertion by evidence of random hybridization banding patterns. Insertional mutagenesis of *P. larvae* for library construction via this mating procedure is continuing. For the *P. popilliae* library, numerous isolates demonstrated similarity in hybridization banding patterns and randomness of transposon insertion was not observed. Library construction via this mating was discontinued and a new mating protocol has been initiated. Conjugative mating using *P. popilliae* Pj1 (recipient) and *Enterococcus faecalis* CG110 (donor) has been started. Approximately 4000 mutants have been isolated. PCR amplification using a Tn916 insertional mutant and a Tn916 primer has been performed and shown to identify and isolate mutant genes. The genes for LysM (peptidoglycan binding) and the heat shock protein ATPase subunit have been isolated from *P .popilliae*. PCR amplification using degenerate primers has been successful at isolating non-specified genes. However, directed amplification for potential target genes (i.e., genes associated with pathogenicity) using degenerate primers has not been successful yet. Preliminary screening of the libraries for specific mutants (i.e., vancomycin resistance, chitinase, and bacteriocin production) has been performed. No mutant isolates have been identified. Efforts to identify new bioassays for screening the library are continuing.

Impact

Annual damage to turfgrass by white grubs is estimated to run around a quarter billion dollars. At present, there is no alternative to the use of chemical pesticides to control this

problem. Biological control with *Paenibacillus popilliae* is environmentally sound, but is not currently an economical alternative. The main goal of this study is to improve the efficiency of *P. popilliae* as a biological control agent.

DEPARTMENT OF ENTOMOLOGY

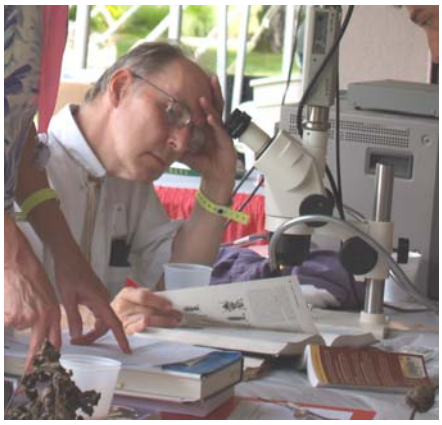
The Department of Entomology is involved in a variety of service, research, pest surveillance, and regulatory activities. The primary service activities are provided through the Insect Inquiry Office. Staff in this office answer insect related questions and identify insects and related arthropods for the public, government agencies, growers, and business organizations. All scientists provide information to citizens of Connecticut by answering telephone inquiries, making farm visits, participating in meetings of growers and other groups, and speaking on their research. Most of the research in the Department has a major applied aspect, addressing the integrated management of ticks, pests of field crops, nurseries, and orchards, and wood-boring insects. Staff members also work closely with organic farmers and landscapers in Connecticut.

The Office of the State Entomologist at the Connecticut Agricultural Experiment Station, created by the Connecticut General Assembly in 1901, is part of the Department of Entomology with responsibility, in part, to ensure our nursery industry is free of plant pests and certify their products for shipment to other states and outside the United States. According to the latest census by the National Agricultural Statistics Survey, the Connecticut Green Industry (i.e., nursery, greenhouse, floriculture, sod, Christmas trees) is the largest agricultural business in Connecticut with a market value of $246 million in 2002. An economic survey by the New England Nursery Association indicated that sales by the Connecticut Green Industry surpassed $1.1 billion in 2005. In conjunction with regulatory activities, Department staff conducts a surveillance program in Connecticut for a variety of established pests like the gypsy moth and for exotic plant pests, some of regulatory concern, that represent a threat to our green industry, forests, and urban ornamental trees and shrubs. Surveillance for plant pests is performed in partnership with the United States Department of Agriculture through the Cooperative Agricultural Pest Survey (CAPS) program and the U.S. Forest Service. One example is the surveillance for Ramorum blight, a fungus-like pathogen that can affect many plants, but that can be particularly devastating to oaks. Other examples are the forest health surveys and statewide aerial survey for gypsy moth defoliation and a gypsy moth egg mass survey. The results of our forest surveys may be found later in the Department's research activities along with summaries of our regulatory activities.

The staff of the Department of Entomology also takes the lead in providing extensive outreach activities for the Experiment Station by providing information to both children and adults about the Experiment Station's research at public events, health fairs, and agricultural fairs, such as the Eastern States Exposition (Big E) in Springfield, MA, the Connecticut Public Television Family Science Expo, Celebrating Agriculture, Yale Peabody Museum's Biodiversity Day, Sikorsky Aircraft's Earth Day, and the Connecticut Flower and Garden Show. Honey bees continue to be a popular exhibit at these events.

Ira Kettle, State Bee Inspector, (right photo, far right) answered questions about honey bees at the CPTV Science Expo (Photos by Rose Bonito)

Department staff also produce fact sheets and other various publications for the citizens of Connecticut. Exhibits, workshops, and inquiry assistance is provided at green industry meetings like the Connecticut Nursery and Landscape Association (CNLA) and Connecticut Protective Association (CTPA).



Rose Hiskes and Ken Welch assist arborists at the CTPA Summer Meeting (July 2006).

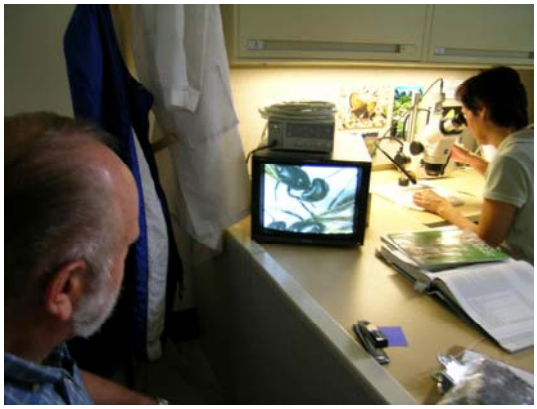
Three pesticide guides toward integrated pest management were produced for Connecticut arborists, nurseries, and Christmas tree growers. In the past two years, nearly 10,000 copies of the Tick Management Handbook have been distributed through northeastern states, most of which went to Connecticut residents, municipal and regional health departments, physicians and hospitals, and Connecticut Cooperative Extension. A revision of the Tick Management Handbook is being reprinted.

Service, research, regulatory, and pest surveillance activities are detailed in the following sections.

SERVICE ACTIVITIES

Insect Inquiry Office: Gale Ridge, Rose Hiskes, and Rose Bonito answered questions from the public. The insect inquiry office, in its more or less current form, has provided services for around 40 years. However, our insect identification services date to the early years of this institution and its mission. Starting with the first Annual Report of the Connecticut Agricultural Experiment Station for 1877, the Station announced, among other things, that it was prepared to "identify useful or injurious insects… and to give useful information on the various subjects of Agricultural Science for the use and advantage of the citizens of Connecticut".

The insect inquiry office served 6,849 people through the year and over 690 different insect and spider species were identified. Ants, termites, bees, and pantry pests continue to be the leading pests of concern. There was an increase in Orange-striped oakworm, mite and scale activity, in particular Honeylocust spider mite and cottony Taxus scale, this past year. Over the past couple of years, staff in the inquiry office have dealt with more cases of delusory parasitosis. Inquiries about ground nesting bees/wasps and Cicada killer activity increased. Staff members also continue to see an increase in inquiries about human bedbugs. In the first half of 2007, 13,792 visits were made to 12 of our fact sheets on our website. The top three fact sheets accessed were on Hemlock Wooly Adelgid, Western conifer seed bug, and Carpenter bee. Ticks, primarily the blacklegged tick *Ixodes scapularis*, would rank up among the highest number of specimens submitted for identification (4,855 in 2006). While ticks are processed in a different laboratory at the Experiment Station, many specimens are submitted through the insect inquiry office.



Gale Ridge examines a specimen, which a state resident brought in for identification. Visitors can view their specimens shown under the microscope on a video screen.

The office served private citizens, the pest control and real estate industries, nurseries, arborists, health departments and other medical professionals, museums, municipalities, libraries, state government, and the news media. Among the 6,849 inquiries, 266 (3.9%) were questions on food crop insects, 1,435 (21%) were on pests of humans or person's dwellings, and 5,147 (75.1%) were related to natural resources. The

office also supported the plant regulatory activities of the Office of the State Entomologist and agricultural and forest pest surveys with assistance on identification of collected insects.

Impact: Stakeholder concerns about a variety of insects, spiders and other arthropods were addressed. Identifications were made to determine which of the various arthropods presented were considered pests. Proper identification provided residents with a guideline as to which arthropods required control and reduced stakeholder concerns about the "pest". Information was given on chemical and non-chemical control measures. In some cases, applications of pesticides could be reduced or eliminated. Correct identification also provided an opportunity for intercepting potential new pests.

A butterfly identification walk was lead by Rose Hiskes and Jeffrey Fengler (Photo by Rose Bonito)

Bird and Butterfly Garden: The garden is a collaborative project of the Federated Garden Club of Connecticut, the Spring Glen Garden Club of Hamden, and the Connecticut Agricultural Experiment Station. Maintenance and improvements to the garden are done by farm manager Richard Cecarelli, his staff, and other Station staff members with monthly care provided by members of the Spring Glen Garden Club. The garden is open to the public Monday-Friday 8:30am-4:00pm. It is closed on the weekends and state holidays. The garden is listed in the Nature Conservancy's garden visiting guide, the Open Days Directory, East Edition. The site has been instrumental in encouraging public interest in plants, insects, and birds.

Rose Bonito, Jeffrey Fengler, and Michael Thomas observed 13 different butterfly species, 3 species of moths, 11 species of birds, and 5 dragonflies in the garden on Plant Science Day August 2, 2006, fewer than in 2005. This may be due, in part, to the high temperature and humidity that day.

Butterflies	*Moths*	*Birds*	*Dragonflies*
Eastern Tiger Swallowtail	Chickweed Geometer	House Finch	Common Whitetail *Libellula Lydia*
Spicebush Swallowtail (including larva)	Polyphem Moth	Northern Cardinal	Twelve-spotted Skimmer *Libellula pulchella*

Monarch (laying eggs)	Lesser Grapevine Looper Moth		Blue Dasher *Pachydiplax longipennis*
Orange Sulphur			Wandering Glider *Pantala flavescens* (in field)
Least Skipper			Spot-winged Glider *Pantala hymenaea* (in field)
Cabbage White			
Common Sootywing			
Peck's Skipper			
Eastern Tailed Blue			
Question Mark (including larva)			
Pearl Crescent			
Tawny Edge Skipper			
Broad-winged Skipper			

Tick Testing: In 2006, Bonnie Hamid, assisted by Elizabeth Alves, identified 4,855 nymphs and adults of the blacklegged tick, *Ixodes scapularis*, submitted by local and regional health districts for Connecticut residents. A total of 2,314 were tested for the presence of the causal agent of Lyme disease, *Borrelia burgdorferi*, by polymerase chain reaction (PCR) techniques, of which 520 (22%) were positive. Unengorged ticks were not tested.

RESEARCH ACTIVITIES

Community Program for the Prevention of Lyme Disease: The blacklegged tick *Ixodes scapularis* (commonly known as the deer tick) is the vector for the Lyme disease spirochete (*Borrelia burgdorferi*), the protozoan that causes human babesiosis (*Babesia microti*), and the agent of human granulocytic anaplasmosis (*Anaplasma phagocytophilum*). The majority of Lyme disease cases (75%) are acquired in the residential landscape, primarily through the nymphal stage of *I. scapularis*. Funded by the Centers for Disease Control and Prevention for 4 years through March 2008, a community-based program is being conducted for the prevention of Lyme disease in the Torrington Area Health District (TAHD) and the Ledge Light Health District (LLHD). Research elements continue in the Westport Weston Health District (WWHD). These local intervention projects are a cooperative effort of the Connecticut Department of Public Health (DPH), Dr. Kirby Stafford of the Connecticut Agricultural Experiment Station, and the local health districts. In the TAHD, research efforts are focused in the towns of Canaan, Cornwall, and Salisbury. In the LLHD, tick control studies have been

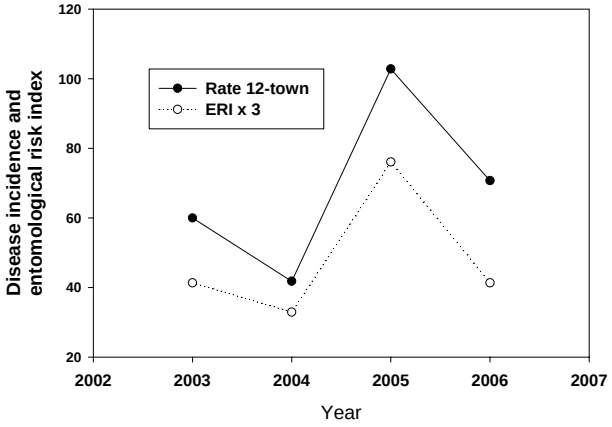
focused in the community of Mumford Cove in Groton. In 2007, the research was conducted with the assistance of Heidi Stuber and summer research assistants Lisa DiFedele, Tara Raftery, Gregory Dunford, Kristen Motel, and Lindsley Colligan and included collecting data on tick abundance and assisting with tick testing and rodent trapping. The testing of the rodent bait boxes (Maxforce Tick Management System, Bayer Environmental Science) conducted from 2002-2006 was discontinued in 2007 as Bayer was no longer manufacturing the boxes due to new EPA requirements and cost issues. However, larger scale field trials of the entomopathogenic fungus *Metarhizium anisopliae* Strain 52 were initiated in 2007.

Entomopathogenic fungi for tick control: Postdoctoral scientist Dr. Anuja Bharadwaj began studies on the survival and efficacy against *I. scapularis* and of the fungus *Metarhizium anisopliae* Strain 52 with Dr. Stafford in 2004 and experimental trials continued through 2007. The fungus is now being developed commercially in an oil-based emulsifiable concentrate (EC) the control of grubs and ticks under the label Tick-Ex (Novozymes Biologicals, Inc., Salem, VA). The product contains 5.5×10^9 colony forming units per ml of *M. anispoliae*. The purpose of the study in 2007 was to determine the efficacy of the fungus in the field. In the laboratory, a concentration 2.6×10^5 cfu/cm^2 brought 72.3% percent mortality of nymphal *I. scapularis* within a week with only 3 minute time exposure. Another objective was to evaluate the effectiveness of an early application. Previously, we had shown that spores survived for more than 1.5 months in fall and for more than 3 months in the summer. With the receipt of *M. anisopliae* spores from Novozymes in late April 2007, field applications with two concentrations (2.6 fl oz/1000 ft^2 and 10.4 fl oz/1000 ft^2) of the spores were made to the lawn-woodland interface at residences in Salisbury (n = 3), Canaan (n = 6), and Cornwall (n = 11) in 8-9 May 2007 by a commercial applicator under the direction of Station and Novozyme scientists. Other residences (n = 21) served as controls. Unfortunately, tick activity was delayed until the end of May in 2007 producing a slightly larger span of time between treatment and tick activity than desired. A second application was made June 29 and July 2, 2007. Ticks were collected at all sites through the summer to evaluate activity and percent mycosis (fungal disease). Control after the early first application was low (average of 46.1% for the lower rate and 26.9% for the higher rate) and variable between sites. This indicates that an application cannot be applied too long before the ticks become active. After the second application, 82.0 and 99.5% control was obtained with the lower and higher rates, respectively, suggesting the lower, more economical rate could be used.

Impact: Results of field experiments will aid in the review of the product (Tick-Ex) for full registration by the US Environmental Protection Agency. The commercial product with the fungus will provide a biological alteration to broadcast insecticides for residential control of the blacklegged tick that is also compatible with organic land care practices.

Tick abundance and Lyme disease incidence: In 2006, Dr. Stafford's staff (Heidi Stuber, Foeleana Sansevero, Benjamin Ross) continued to monitor populations of *I. scapularis* nymphs on the lawns and adjacent woods at several residences in Lyme, Old Lyme, and East Haddam, Connecticut, by dragging the vegetation with a square meter cloth 'tick drag'. Ticks have been collected at these residences since 1989 and the

number of Lyme disease cases in the region continues to be reflected by the sampled population of infected ticks. Tick activity was lower in 2006 in these three communities (436.3 nymphs per hectare) compared with 2005. Even though only 6.5% (of 261 tested) were infected with *B. burgdorferi*, the risk index based on the abundance of infected ticks was 25.4 vs. values less than 20 for the past 5 years in this region. Only 19 cases of Lyme disease were reported in East Haddam, Lyme and Old Lyme in 2006, compared to 27 and 10 for 2005 and 2004, respectively. Statewide, the number of reported cases decreased slightly to 1,788 in 2006 compared to 1,810 in 2005. Comparisons on long-term trends in tick activity and prevalence of infection with reported incidence of Lyme disease will permit a better understanding of the relationship between tick abundance and disease incidence.



Comparison of the entomological risk index (ERI) x 3 (abundance of infected ticks) for the towns of East Haddam, Lyme and Old Lyme with the reported incidence of Lyme disease per 100,000 population for a 12-town area around the Connecticut River, which includes the three sampled towns, 2003-2006.

Mosquito-Borne Infections: Dr. Louis A. Magnarelli, assisted by Tia Blevins and Bonnie Hamid, collaborated with Dr. John F. Anderson, Dr. Sandra L. Bushmich (UConn, Storrs), Dr. Michel Ledizet (L^2 Diagnostics), and Dr. Raymond A. Koski (L^2 Diagnostics) on measuring West Nile virus (WNV) antibodies in horses. A newly developed enzyme-linked immunosorbent assay (ELISA) and plaque reduction neutralization tests (PRNT) were used to confirm natural or vaccine-induced exposure to the virus in 44 privately owned horses in Connecticut. Serologic tests were also performed on sera from 43 additional horses, collected prior to the initial outbreak of West Nile encephalitis in 1999. Analyses of an ELISA and PRNT detected WNV antibodies in 21 (91%) of 23 sera from naturally exposed horses and in more than 85% of the 20 vaccinated subjects. Overall serologic results for both tests were highly concordant (91% agreement). There was no convincing evidence of horse exposure to WNV prior to 1999. Since some vaccinated horses did not produce antibodies, it was suggested that one or both diagnostic tests be performed on horse sera after vaccinations to ensure that protective antibodies are present.

***Impact*:** Laboratory findings had impact because veterinarians are now testing horse sera following vaccination for West Nile to confirm that protective antibodies were produced.

Spruce Needleminer: Caterpillars of the Eurasian spruce needleminer, *Batrachedra pinicolella* (Lepidoptera: Batrachedridae), devour the needles of spruces, causing damage that could affect their value as Christmas trees. Dr. Maier first discovered this invasive moth in Connecticut in 1997—the first record from North America. In 2006, he trapped adult males in pheromone-baited traps in Orange and Barkhamsted to determine their flight period in Connecticut. In Orange, moths flew from early June to mid-July, whereas in Barkhamsted, the more northern site, their flight period was delayed by about one week. Characterization of the flight period of this invasive moth will assist foresters, landscapers, and Christmas tree growers in developing management plans to control this pest of spruces.

Surveys for Exotic Insects: In a 2006, Dr. Maier and his summer assistants, James MacDonald and James Feldhouse, conducted formal surveys sponsored by the United States Department of Agriculture to determine if four exotic insects—the brown marmorated stink bug, the apple tree tortrix, the summer fruit tortrix, and the sirex wood wasp—were established in Connecticut. The first three, which are potential fruit pests, were not discovered in the surveyed counties of Fairfield, New Haven, Middlesex, and New London. The wood wasp, known to kill pine trees in New York, was not found in Litchfield or New Haven Counties where Dr. Maier trapped. Fruitgrowers and foresters can breathe a collective sigh of relief because they will not have to budget funds to manage these insects in areas surveyed in 2007.

In 2006, Dr. Maier continued to determine the distribution of three alien leaf-cutter bees (Hymenoptera: Megachilidae). The three bees—*Anthidium manicatum, A. oblongatum*, and *Megachile sculpturalis*—occurred throughout Connecticut and in nearby counties in most adjacent states. The distributional and flower-visiting records of these bees may assist in determining their impact upon native bees.

Classical Biocontrol of Leafminers in Apple Orchards: In spring 2006, Dr. Maier, and his assistants, Tracy Zarillo and Morgan Lowry, continued to measure the effectiveness of the Palearctic parasitic wasp, *Holcothorax testaceipes*, in suppressing a foreign leafminer in an unsprayed apple orchard at Lockwood Farm. The parasite, first released in 1988, killed 22% of the larval leafminers of the first generation. It was the second most effective parasite in the orchard, accounting for 34% of the parasite-induced mortality of leafminers. To determine how *H. testaceipes* might improve biocontrol in commercial apple orchards, Dr. Maier has released the parasite into four orchards with different spray programs.

Longhorned Beetles of Connecticut: Ever since the discovery of the Asian longhorned beetle in New York, longhorned beetles (Coleoptera: Cerambycidae) increasingly have been under scrutiny to ascertain the potential spread and impact of non-native species. In 2006-2007, Dr. Maier, assisted by Tracy Zarrillo, Morgan Lowry, and others, initiated a long-term study to determine the distribution, food, and adult flight periods of longhorned beetles in New England. They have estimated that 215 species of these beetles could occur in Connecticut. By combining information from trapping, rearing, and museum specimens, they have acquired new distributional data on 146 species (68% of the total). Trapping with sticky bands on girdled trees and with baited

Lindgren funnel traps in 2006 and 2007 has added important data on the distribution, flight period, or both of about 60 species of beetles. In all, 55 species have been reared from dead wood collected in New England, New York, or New Jersey. The fundamental information derived from this study should assist stakeholders in identifying, evaluating the impact, and controlling these wood-boring beetles.

Swede midge survey: Dr. Kimberly Stoner, assisted by Adam Scheinkman, found the first swede midge in Connecticut in July 2006. This insect pest, originally from Europe, had previously been found in Ontario, Quebec, and New York State. It attacks the growing point of plants in the cabbage family, including broccoli, cauliflower, collards, and Asian salad greens in addition to cabbage. The feeding of larval midges causes deformation of the plant so that the product becomes unmarketable. Dr. Stoner is continuing to survey for this insect using pheromone traps on vegetable farms in five counties of Connecticut in 2007 with assistance from Nathan Brettschneider. Potential swede midge specimens have been sent to a specialist for identification.

Pesticides in Pollen: Dr. Stoner, in collaboration with Dr. Brian Eitzer of the Analytical Chemistry Department and Ira Kettle, the state bee inspector, has begun collecting pollen from five bee hives across the state and screening the pollen for pesticides. Low levels (<1 part per billion) of several pesticides; such as coumaphos, carbaryl, atrazine, chlorpyrifos, myclobutanil and imidacloprid have been found. These include miticides used for control of varroa mites in bee hives, and insecticides, fungicides, and herbicides used on crop plants. This survey will be continued through the season of bee activity at several locations in order to get an accurate baseline of pesticides that may be affecting the health of the honey bees.

*Events Sponsored***:** Dr. Stoner organized the Community Farming Conference, Feb. 10, 2007, Mercy Center, Madison, CT. This event, which is for community groups across the state that are developing or have community farms, drew 50 people to hear Elizabeth Henders of NOFA-NY speak on Community Supported Agriculture (CSA) and Lynda Simkins of the Natick Community Farm speak on Educational Programs at Community Farms. Participants also formed small groups focused on education, CSAs, forming an agricultural district in town government, and forming a non-profit organization. This conference was organized with assistance from CT NOFA and Bill Duesing. Dr. Stoner also sponsored a holistic management training session in ecological land management June 2, 2007, Ambler Farm, Wilton, CT. This training session with

Phil Metzger of the Natural Resources Conservation Service of the U.S. Department of Agriculture and Erica Frenay of the Cornell Small Farms program drew 25 people.

Cedar Beetles: Dr. Claire Rutledge continued investigation of *Callidiellum rufipenne*'s chemical ecology in collaboration with Dr. Lawrence Hanks of the University of Illinois, Urbana-Champaign and Dr. Jocelyn Millar of the University of California, Riverside and their students. *Callidiellum rufipenne* is native to eastern Asia and was discovered in live arborvitae in Connecticut in 1998 by Gale Ridge, Carol Lemmon and Dr. Chris Maier. The borer has since established in the southern half of Connecticut. *Callidiellum rufipenne* is found most frequently on plants in the families Cupressaceae and Taxodiaceae. As we discovered last year, male *C. rufipenne* produce a volatile compound. This compound is consistent in chemical structure with recently discovered aggregation pheromones produced by males of two other cerambycid beetles; the red-headed ash borer (*Neoclytus acuminatus acuminatus*(Fabricus)) and the red-oak borer (*Enaphalodes rufulus* (Haldeman)). We continued to investigate the exact function of this volatile pheromone. Based on results of field studies using a volatile compound mix, which is broadly attractive to Cerambycineae, combined with host plant material as a lure, female beetles respond more strongly to the male-produced volatiles. The volatiles are active over a fairly short range. This knowledge could potentially be exploited as a monitoring tool in the future.

Bronze Birch Borer: Host Location – Dr. Rutledge examined the strategies by which the Bronze Birch Borer, *Agrilus anxious* Glory, a native insect, locates its hosts. The beetles require stressed living trees to develop, and thus frequently attack birches in landscape and nursery settings. The beetles cause considerable aesthetic and financial damage to homeowners and nurserymen in Connecticut. Following results from the summer of 2004, which suggested that borers can discriminate between stressed and healthy trees, we have begun to sample and analyze the air surrounding healthy and stressed birches in cooperation with Dr. L. Hanks of the University of Illinois to attempt to isolate the attractive compounds.

Emerald Ash Borer, Two-lined Chestnut Borer and Bronze Birch Borer: Mating Behavior – Dr. Rutledge, in collaboration with Dr. Juli Gould of USDA APHIS initiated a study of the mating behavior of these three members of the *Agrilus* genus. All three species are destructive borers. Two-lined Chestnut Borer (*A. bilineatus*) and Bronze Birch Borer (*A. anxious*) are native species that are pests of stressed oaks and birches, respectively, in landscape settings. Emerald Ash Borer, *A. planipennis*, was introduced to the United States recently and poses a serious threat to all native ash species. Detailed observation of pairs of mating adults is being made to determine mate choice and other factors leading to successful reproduction by these insects, potentially leading to strategies to disrupt population growth.

NURSERY INSPECTION AND CERTIFICATION

Three-hundred and eighteen nurseries were certified to conduct intra- and interstate business. There were 780 nursery inspections during the growing season. Eight-thousand, six-hundred and thirty-two acres of nursery stock were examined as well as

plants growing under 32,795,447-sq. ft. of greenhouse space. The majority of plants were grown in hoop houses (28,419,100 sq. ft.), followed by plastic greenhouses (2,669,847 sq. ft.) and glass greenhouses (1,706,500 sq. ft.).

NURSERY INSECTS

The most abundant pests found in nurseries were mites on various trees and shrubs, aphids on various trees and shrubs, black vine weevil *(Otiorhynchus sulcatus*) on *Taxus*, lacebug on *Pieris* and *Rhododendron*, Rhododendron leafminer on *Rhododendron* and Arborvitae leafminer on *Thuja.*

JAPANESE BEETLE CERTIFICATION

We observed treatments of 328,367 plants at two nurseries and issued phytosanitary certificates to comply with states that quarantine nursery stock from Connecticut because of the Japanese beetle, *Popillia japonica*.

One nursery, which met the containerized nursery stock accreditation program requirements of the United States Japanese Beetle Harmonization Plan, shipped 130 plants to other states in 2006.

Two nurseries met other requirements of the United States Japanese Beetle Harmonization Plan and shipped 4,043 plants to states that quarantine plants from Connecticut.

JAPANESE BEETLE CERTIFICATION TO CANADA

Ten Connecticut nurseries, which met the inspection requirements of the US/Canada Japanese Beetle Harmonization Plan, shipped 65,333 plants to Canada in 2006.

NURSERY DEALER PERMITS

Nursery dealer permits were issued to 167 firms. One-hundred and forty-nine of these companies operate individual outlets. The remaining businesses have more than one outlet each. In total, there were 475 outlets.

INSECT AND ENVIRONMENTAL PROBLEMS

We assisted nurseries and private citizens with the following problems in 2006:

1. Inspected 25 White pines for one homeowner for drowning problem.

2. Inspected three nurseries for special insect problems.

PHYTOSANITARY CERTIFICATES

Four-hundred and twenty-four phytosanitary inspection certificates were issued covering the shipment of the following plant materials to destinations outside the United States:

Plants	Number
Apples (Cartons)	7,000
Bedding plants (Flats)	1,000
Bulbs & Tubers (Dahlia, Lilium, Gladiolas)	2,627
Chinese tree peonies (plants)	32
Greenhouse plants	6,032
Nursery stock (containers)	27,248
(bare root plants)	334
Orchids (plants & flasks)	4,247
Perennials (bare root plants)	6,505
(plants)	28,298
Seeds (cartons)	20
Tobacco (bales, boxes, bundles & cartons)	151,482

SPECIAL INSPECTIONS

1. Twenty-six inspections were made for 1,629 individual plants and bulbs to assist homeowners moving out of state.

2. One-hundred and fifty-seven inspections were made to assist nurseries moving the following plants interstate:

Plants	Number
Perennials (plants)	329,244
Nursery stock (containers)	278
(bare root plants)	1,500
(B & B)	1,412
Christmas trees	2
Corn seed (pounds)	4

Geraniums	1,820
Greenhouse plants	633

3. Two tobacco growers had 133 acres inspected for the aerial application of pesticides.

4. Sixteen post-entry inspections were carried out on 16,474 plants at 3 locations. At two sites, 3,785 plants were released from quarantine.

INSECT AND DISEASE SURVEYS

FOREST HEALTH SURVEY

During the summer of 2006, we examined 51 permanent, one-acre forest plots that were established to monitor forest health in Connecticut. These plots are located on state, Nature Conservancy, and municipal water company properties. We considered 25 pathogens for monitoring and determined which trees served as host plants. Within each plot, 20 to 30 trees were tagged for long-term studies. We evaluated signs of defoliation and disease, such as dead tree branches, limbs and crowns. Descriptions and determinations are designed to reflect increasing damage or tree decline. We measure the trees at Diameter at Breast Height (DBH) as an additional way to monitor their health. We will continue to use these plots to monitor the forests over several years to assess whether our state forests remain healthy or are declining. In general, our forests remain healthy.

GYPSY MOTH

Our annual aerial survey for gypsy moth defoliation was conducted in July-August 2006 and covered 1.8 million acres of urban/suburban forest in all eight Connecticut counties. Gypsy moth defoliation of 251,946.21 acres was found in following counties:

COUNTY	TOTAL ACRES
HARTFORD	11,675.20
MIDDLESEX	105,841.07
NEW HAVEN	140,13.75
NEW LONDON	108,843.58
WINDHAM	3,463.82
	251,946.21

In November and December, a gypsy moth egg mass survey was conducted in 80-95% favorable host sites on a 7 -mile grid (102 sites) throughout Connecticut. At seven sites, egg masses were found in low numbers (less than 100 per acre) that may indicate a build up in population. At two sites, egg masses were found in numbers large enough (more than 112 per acre) to be considered a potential problem for the spring and summer of 2007.

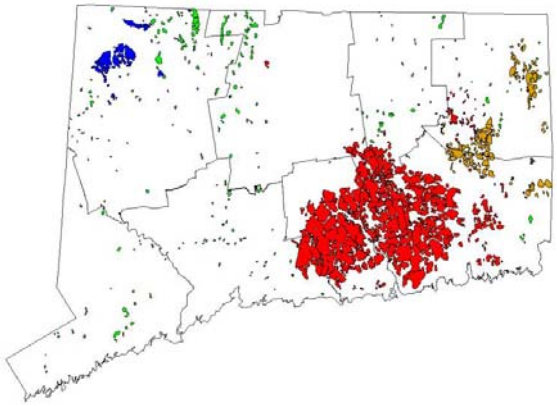
ORANGE-STRIPED OAKWORM

The Orange-striped oakworm, *Anisota senatoria*, is a native moth that ranges from eastern Canada southward to Georgia. It is a common pest of oak species in Connecticut. Occasionally, local infestations occur when oaks have been stressed by other factors, such as drought or gypsy moths. Serious defoliation can occur when this happens. The moths lay up to 500 eggs on the undersides of oak leaves in early summer and are attracted to artificial light. The caterpillars feed on the foliage, and then they burrow into the soil and build an earthen cell, where it pupates and passes the winter. On September 20, 22, & October 6, 2006, a statewide aerial survey was conducted for orange-striped oakworm defoliation. Defoliation was found in Windham County (19,445.4 acres) and in New London County (11,857.7 acres). Total acres defoliated were 31,303.

FOREST TENT CATERPILLAR

The Forest tent caterpillar, *Malacosoma disstria*, is a native insect found throughout the range of hardwood forests in North America. It is more abundantly distributed in eastern North America, but is also common in western areas that have large stands of aspen. At times, this insect can be a damaging defoliator of trees. Trees that are defoliated often flush a new, smaller set of leaves in July. While the forest tent caterpillar does not typically cause mortality to host trees, mortality can occur when populations interact with other disturbances, such as drought or insect outbreaks. Forest tent caterpillar larvae use silk to form trails and to create pads on host trees where they congregate and rest. During 2006, an outbreak of Forest tent caterpillar resulted in the defoliation of 15,582.73 acres in Litchfield County.

DEFOLIATION IN CONNECTICUT - 2006



GYPSY MOTH – RED
ORANGE STRIPED OAKWORM – ORANGE
HARDWOOD ANTHRACNOSE – GREEN
FOREST TENT CATERPILLAR – BLUE
HEMLOCK WOOLLY ADELGID - YELLOW
HARDWOOD ANTHRACNOSE:

Anthracnose is a fungal disease that occurs on hardwood trees and is caused by a number of different fungi. It is favored by cool wet conditions during the spring, when leaf expansion is occurring. Anthracnose causes leaf deformation, discoloration, and defoliation, and if repeated over several growing seasons, can weaken trees and cause tree death. In 2006, favorable conditions for oak and maple anthracnose resulted in considerable discoloration and defoliation (photo below courtesy of Dr. Sharon Douglas, CAES). Since damage was sufficient, we included anthracnose in our annual aerial survey:

County	Acres
Fairfield	2,709.24
Hartford	5,378.92
Litchfield	9,843.78
Middlesex	30.40
New Haven	2,340.23
New London	777.25
Tolland	2,579.43
Windham	1,553.20
Total acres	25,212.45

Anthracnose damage

ASIAN LONGHORNED BEETLE

The Asian longhorned beetle, *Anoplophora glabripennis*, was first discovered to be attacking trees in August of 1996 in New York. This insect has spread to within 25 miles of Greenwich in southwestern Connecticut.

There is risk for beetle entry in ports because of the transportation of solid wood packing material on ships coming from Asia, where this beetle is native. We, therefore, concentrated additional survey efforts in Connecticut in the areas of Bridgeport, Groton, New Haven and New London as well as their surrounding parks that contain a high percentage of maple, a favorite food source of the Asian longhorned beetle. All surveys and identifications, thus far, were negative. We also inspected trees for 5 homeowners in 2006.

Asian Longhorned Beetle Survey 2006

County	# Inspections	# Trees Inspected	# Infested Trees
Fairfield	7	768	0
Hartford	5	59	0
Middlesex	1	70	0
New Haven	20	2,513	0
New London	15	2,283	0
Totals	48	5,693	0

HEMLOCK WOOLLY ADELGID

The hemlock woolly adelgid, *Adelges tsugae*, remains an important pest of hemlock in Connecticut, spreading northward since its coastal detection in 1985 and infesting all 169 towns in the state.

During 2006, we required all hemlock nursery stock that was being shipped out of Connecticut to be treated for hemlock woolly adelgid. Two nurseries shipped hemlock trees out of state. Our inspectors observed treatments and issued phytosanitary certificates to cover 1,437 plants in these shipments.

PINE SHOOT BEETLE

During February, 2006, Lindgren Funnel traps were set up for Pine shoot beetle. Fifty traps were set up statewide and were monitored at two-week intervals through mid-May. One adult Pine shoot beetle was found in the Town of Thompson in Windham County. All of Connecticut has been added to the federal Pine shoot beetle quarantine because of the presence of Pine shoot beetle in Massachusetts and Connecticut.

County	Traps Set for Pine shoot beetle	Pine shoot beetles caught in traps
Fairfield	10	0
Hartford	5	0
Litchfield	10	0
Middlesex	5	0
New Haven	5	0
New London	5	0
Tolland	5	0
Windham	5	1

RAMORUM LEAF BLIGHT

Ramorum leaf blight is a serious plant disease that attacks many types of plants and trees common to Connecticut. It is currently known to occur in the Pacific Northwest on oaks, azaleas, big leaf maples, huckleberry, California bay laurel, camellia, myrtles, honeysuckle, Pacific madrone, Douglas fir, rhododendrons, and viburnum. It does not affect humans and is not a food safety concern.

Ramorum leaf blight is caused by a pathogen called *Phytophthora ramorum*. The pathogen is not a fungus or a bacterium, but a member of a unique group of organisms called Oomycetes. Oomycetes share some characteristics of fungi but are biologically different.

As part of the National Nursery Survey, we looked for symptoms of Ramorum Leaf Blight by inspecting plants in nurseries and garden centers and plants being shipped to interstate and Canadian destinations. A total of 80 inspections were carried out on 34,908 *Rhododendron*, 12,054 *Pieris*, 13,102 *Kalmia*, 10,899 *Viburnum*, 8,268 Syringa, and 10,381 *Vaccinium*. An additional 4,552 plants on the host list were examined.

One positive for Ramorum Leaf Blight was found during sampling and monitoring as part of the Confirmed Nursery Protocol. The dealer in question had had a positive in 2004. A foliar sample was taken from three plants in a block of 25 Rhododendron 'Baden Baden' (grown in Oregon) on 23 June 2006 (photo below). The sample was confirmed by USDA/APHIS scientists in Beltsville to be *P. ramorum* on 4 August 2006. Emergency Action Notification and stop-sale orders were issued on 7 August 2006 by the USDA-APHIS-PPQ officials in Wallingford CT, and incineration of host and associated host material, potting media, and mulch was completed on 14 August 2006. In total, 4 truckloads of regulated waste, nearly 35,000 pounds, were destroyed. Sampling of water, mulch, and soil from the site was negative. Trace-back sampling of the grower in Oregon was negative. This dealer will now be under the Confirmed Nursery Protocol for 3 more years.

A nursery forest environs survey was done in conjunction with the US Forest Service. The perimeter survey was done on three large wholesale nurseries, the three nurseries that had positives during the nursery trace forwards in 2004 and one woodland plot. Four one hundred meter transects were measured using Global Position System (GPS) along nursery perimeter. The starting and ending trees marked with GPS readings and tape. The woodland plot transects measured from one starting point tree.

All host species along the transects were examined for possible symptoms of *Phytophthora ramorum.* No infected leaves or tree cankers were found.

DAYLILY RUST

A rust fungus (*Puccinia hemerocallidis)* was found on daylilies in a southeastern U.S. nursery for the first time in the summer of 2000. It was found in Connecticut in 2001 and 2002 on daylilies owned by private citizens. It is now confirmed to occur in three

counties. During 2006, we surveyed daylilies in nurseries and garden centers for signs of this rust. Ninety-two inspections were carried out on 74,446 plants. No signs of *Puccinia hemerocallidis* were found

CHRYSANTHEMUM WHITE RUST

During 2006, we continued to survey for *Chrysanthemum* white rust disease, caused by the fungus, *Puccinia horiana*. We inspected 1,328,726 chrysanthemums raised by 367 growers and dealers for the presence of chrysanthemum white rust. No chrysanthemum white rust was found.

WAREHOUSE SURVEY FOR WOOD BORING INSECTS

In early 2006, we conducted a trapping survey of 15 Connecticut warehouses in 5 counties to detect the possible presence of exotic wood boring insects. Lindgren funnel traps, with a chemical lure, were placed in the warehouses and checked bi-weekly for insect activity. No exotic insects were found.

APIARY CERTIFICATION

Three-hundred and seventy-eight beekeepers registered 2,909 colonies in 2006. Our bee inspector opened and inspected 1,187 colonies in areas known to have foulbrood disease. American foulbrood was found in 29 colonies. These colonies were destroyed.

County	Colonies Opened & Inspected	American Foulbrood Positive
Windham	404	
New London	157	
New Haven	440	
Hartford	64	12
Middlesex	43	13
Litchfield	20	
Fairfield	18	4
Tolland	41	
Totals	1,187	29

Varroa mites were present in all colonies, treated or untreated. Varroa mites are now established statewide in Connecticut.

During 2006, 100 honeybees from 1 apiary in the town of Clinton were examined in the laboratory for the tracheal mite, *Acarapis woodi*. There were no positives for tracheal mites.

DEPARTMENT OF FORESTRY AND HORTICULTURE

Connecticut's landscape is a quilt of forests, farms, towns, and cities. Scientists in the Department of Forestry and Horticulture are studying the factors that influence both forest and farm productivity, including novel specialty crops, and the effect of the growing deer population on natural and managed landscapes. Connecticut has a strong link to the forest. Approximately 60% of Connecticut's land area is classified as forest. In addition to valuable non-commodity amenities (watershed protection, wildlife habitat, passive recreation), the forests are a valuable part of the local economy. Connecticut has a $500 million wood product industry of 350 firms that provide employment to 3,600 loggers, millworkers, and others.

Two major threats to natural preserves and managed forests are exotic plant species and browsing by overabundant white-tailed deer herds. While barberry has been widely reported in the popular literature to "displace" native plants, few papers directly examined the influence of alien invasive shrubs on native communities. There have been no studies to determine if native species were displaced by the invasive species, or conversely, if another factor (e.g., deer browse) removed the native species and invasive species exploited the open habitat.

Japanese barberry control: Japanese barberry has spread beyond manicured landscapes and is naturalized in at least twenty-four eastern states. Throughout the region, especially where white-tailed deer populations are high, dense barberry stands develop in the forest understory. These dense barberry stands are associated with a paucity of both tree regeneration and herbaceous plants. Barberry may alter nitrogen cycling and thereby affect soil biota. A Maine study found black-legged tick (*Ixodes scapularis*) populations were twice as high under barberry as in adjacent forests. As black-legged ticks are associated with several diseases including Lyme disease, human granulocytic anaplasmosis, and human babesiosis, extensive barberry infestations may have an indirect, adverse effect on human health.

Dr. Jeffrey S. Ward began a pilot study in spring 2006 to assess the potential of a backpack propane torch to control established barberry in Connecticut. Two study areas were established in cooperation with the Regional Water Authority (North Branford) and Lord's Creek Farm (Lyme). A third study area was established in Storrs in cooperation with the University of Connecticut. At each study area, 125 barberry clumps were selected and the following measurements recorded: clump height and width, number of stems in each clump, basal diameter of clump, and the diameter of the three largest stems within each clump.

Each clump was assigned one of five burning regimes or treatments: 1) control (no treatment), 2) pre-leafout and no follow-up, 3) pre-leafout and follow-up treatment in July, 4) post-leafout without follow-up, and 5) post-leafout with follow-up in July. Each treatment was twenty seconds of flame applied to the base of each clump using a 100,000 BTU propane torch. Pre-leafout treatments were applied in early April. Post-leafout treatments were applied on mid-May. The second treatment was applied in July. Treatment effectiveness after the first growing season was assessed in late September 2006 by counting the number of surviving and new sprouts in each clump, and measuring the height and width of each clump.

Both pre-leafout and post-leafout burning without a follow-up treatment were effective in killing aboveground stems, averaging 41 and 48%, respectively. None of the seventy-five untreated clumps died. The second treatment in July increased mortality to 75%. Mortality following a single treatment was closely linked to initial clump size. Mortality ranged from a high of 96% for the smallest clumps to only 13% for the largest clumps. Second, higher and more consistent mortality was noted for clumps that had been treated twice. Mortality was approximately 80% for clumps smaller than one meter and 60% for clumps that were larger than a meter.

Torching a barberry clump

Both a single and double application of directed flame greatly reduced the size of surviving clumps. Average post-treatment clump size was less than 35 cm, except for those clumps that had been at least 160 cm before treatment. Clumps that were at least 160 cm before treatment were also much smaller, averaging only 62 cm after one treatment and 47 cm after two treatments.

Backpack propane torches provide an organic alternative to control barberry in parks, nature preserves, or forests where barberry infestations are still small. Treatments during the first year can be expected to kill many of the smaller clumps and greatly reduce the size of the larger clumps. Because mortality was very high for clumps smaller than 80 cm, the small size of the clumps at the end of 1st growing season suggests that a second year of treatment would result in the mortality of most barberry clumps. If herbicide use was permitted, pretreatment with propane torches would reduce the crown volume to only 2% of the original crown volume. Thus, a correspondingly lower amount of herbicide would be needed.

Impact: Propane torches have been purchased to control barberry on lands managed by Connecticut DEP-Wildlife Division (22,000 acres), Colebrook Land Conservancy (566 acres), and Northern Connecticut Land Trust (435 acres). Requests for information about this technique have also been received from the USDA Forest Service, Moosehorn National Wildlife Refuge (Maine), Anacostia Watershed Society (Maryland), several private natural resource managers, and the general public.

Large scale Japanese barberry control: **Dr. Ward** began a research project in 2006 to develop a cost-effective method for controlling large (10+ acres) Japanese barberry infestations. This research will not only evaluate the effectiveness and relative costs among treatment combinations to control Japanese barberry, but by monitoring individual clumps across a range of size classes, will assess whether treatment prescriptions are dependent on clump size.

Dense barberry stand in Redding

Two study areas were established on a Regional Water Authority (RWA) watershed in North Branford, CT. Two study areas were established on the Centennial Watershed State Forest in Redding, CT that is jointly managed by the Connecticut Department of Environmental Protection, The Nature Conservancy, and the Aquarion Water Company of Connecticut. One study area was established on The Nature Conservancy lands in Salisbury, CT. The sixth study area was established in Storrs, CT on the University of Connecticut Experiment Forest. All study areas have extensive stands of mature Japanese barberry.

The three initial treatments to reduce the size of the established barberry clumps were: prescribed burning, mechanical mowing with a drum chopper, and mechanical mowing with a brush saw. The mechanical mowing with a drum chopper was completed in March 2007. Barberry clumps missed by the drum chopper (adjacent to trees, stone walls, or large rocks) were cut with a brush saw. Brush saw treatments were completed in April 2007 and the prescribed burns were completed in May 2007.

The second, follow-up treatments for the sprouts that developed after the initial treatments included foliar application of herbicide (triclopyr and glyphosate), directed flame (propane torch), and no follow-up treatment (control). Each follow-up treatment will be applied over each initial treatment, i.e., separate sections of drum chopped areas will be treated with triclopyr, glyphosate, propane torch, or left untreated. Per company policy, herbicides will not be tested at RWA. Therefore, these follow-up treatments will be used at RWA: directed flame (propane torch) during initial spring flush (late May), directed flame after initial flush completed (early July), directed flame during initial spring flush and again in late July.

Impact: Developing cost-effective methods of controlling Japanese barberry will allow large land owners to maximize the area treated each year. This research is partly funded by Regional Water Authority, Aquarion Water Company, and The Nature Conservancy. They collectively manage over 50,000 acres that include extensive areas of barberry.

Interaction of deer browse and barberry infestations: The barberry control study provided the unique opportunity to superimpose, at minimal expense, a study examining the separate and interactive effects of deer browsing and alien invasive species on native

herbaceous vegetation and tree regeneration. At the North Branford, Redding, and Storrs study areas, **Mr. Scott C. Williams** and **Dr. Ward** erected deer exclosures in May 2007 on plots that were treated with the Fecon mower, plots treated with the Fecon mower with propane torch follow-up, and on plots where the barberry was not treated. For each treatment, regeneration and herbaceous vegetation will be sampled using ten 4-m^2 circular plots inside and outside the exclosures. This study will determine in the effects of deer browsing should be incorporated in treatment guidelines for controlling Japanese barberry.

Each year, more and more Connecticut residents have the opportunity to watch deer in their own backyard and gardens. Unfortunately, this increasingly common sight has a cost. Many a gardener knows the frustration of waking up to find prized roses, perennial plant beds, or vegetable gardens damaged by deer browse. In 2001, it was estimated that deer nationwide were the cause of $407 million in losses to field crops, vegetables, fruits, and nuts.

Applying deer browse repellents

Deer Repellent Study: **Dr. Jeffrey S. Ward** and **Scott C. Williams** continued a deer repellent trial that was begun in spring 2006 at two different sites within Connecticut. Deer repellents are most often strong and/or foul-smelling agents that are applied directly to plants in an attempt to prevent deer from browsing and ultimately damaging them. Repellents work in different ways: some make the animal nauseous, others taste very hot or bitter, while others are supposed to invoke fear. Ten different repellent formulations are being tested: Chew Nott®, Deer Away®, Big Game Repellent®, Plantskydd®, Bobbex®, Liquid Fence®, Deer Solution®, Hinder®, Repellex® systemic tablets, and coyote urine. Other repellent trials have been completed, but none as extensive with such a varied array of repellent types. At both sites, Windsor and Woodbridge, 144 yews (*Taxus*) and 144 hostas (*Hosta*) were planted in 2006, and 144 impatiens (*Impatiens*) were planted in 2007. Twelve hostas, twelve yews, and twelve impatiens at each site received one of twelve treatments (the ten different repellents, a fence, and untreated control). Manufactures instructions for repellent application are being followed. Results from this study will be summarized in early 2008 to inform Connecticut residents about the most effective repellent for use on these three browse susceptible species.

Impact: Deer browsing costs the Connecticut nursery industry $3-4 million annually in direct damages, control measures, and lost sales. Several products appear effective and their use could decrease annual deer browse damage by $300,000 or more.

Deer Browse Exclosure Study: One method to study the impact of deer on natural ecosystems is to compare growth rates and species diversity of vegetation protected from deer browse to unprotected plots. **Mr. Williams** and **Dr. Ward** collected vegetation data within and outside sixteen deer exclosures throughout the state. Deer exclosures prevent

deer from accessing vegetation within. Growth rates and species diversity of enclosed vegetation were compared with that of an adjacent control plot, where deer have access to vegetation. The project is a collaborative effort with The Nature Conservancy to maintain and sample twelve deer exclosures, four each at Burnham Brook Preserve in East Haddam, the Bingham Easement also in East Haddam, and Devil's Den Preserve in Weston. We are also including four of our own exclosures on South Central Connecticut Regional Water Authority property in North Branford. Data analysis for the spring 2005 through fall 2006 sampling period indicates that herbaceous cover within the exclosures is greater than control plots. Density of tree seedlings at least two feet tall was twice as high within exclosures compared to control plots. All locations will be resampled for both woody and herbaceous vegetation in late summer 2007. Results from this study will reveal plant species composition and growth rates in the absence of deer.

Pokeweed seed in a deer pellet

White-tailed Deer as Seed Dispersers in Connecticut: **Scott C. Williams** and **Dr. Jeffrey S. Ward** completed analysis of data collected over four years (2002-2005) examining the role of white-tailed deer as seed dispersers. A total of 566 deer pellet groups were collected (2002-2005) in the towns of Guilford, North Branford, Cheshire, and Norfolk. Entire pellet groups were collected and placed in individual sampling bags and vernalized at 5°C for 60 days. After sixty days of vernalization, pellet groups were placed on and lightly covered with a growing medium and kept in a temperature controlled greenhouse.

A total of 11,512 seeds germinated from 61% of pellet groups. Seventy-one taxa positively identified to the species level accounted for 97% of seedlings. Two percent of seedlings died before identification was possible. Sixteen taxa could only be identified to genus (0.9% of seedlings). The majority of species (64%) and seedlings (77%) were not native to the State of Connecticut. Such species include purslane (*Portulaca oleracea*), Carolina horsenettle (*Solanum carolinense*), lamb's quarters (*Chenopodium album*), wine raspberry (*Rubus phoenicolasius*), common plantain (*Plantago major*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), honeysuckle (*Lonicera* sp.), as well as others.

Concurrent with the pellet study, adult does were fitted with a Global Positioning System (GPS) collar programmed to record locations every two hours. Median maximum travel distance for a 24-hour period was 1864 feet with a maximum distance of 19,462 feet. Maximum travel distance for a 24-hour period was at least 6,600 feet for 4% of observations and at least 13,000 ft for 1% of observations.

The capacity of deer to transport viable seeds thousands of feet confounds the problem of controlling exotic invasive plant species that are deleterious to native ecosystems. Continued forest fragmentation will increase the amount of edge habitat where white-tailed deer and exotic plant species thrive, and the proportion of intact forest within the

range of suburban deer. Effective eradication of invasive species will require control measures to be implemented at least one-half mile from preserve boundaries to minimize reestablishment of new infestation points of deer dispersed seeds. Protection of larger forested tracts will minimize seed input of exotic species by deer and also provide habitat suitable for forest interior birds and other wildlife species.

Impact: Maintaining the ecosystem services (e.g., filtering water and air) provided by a healthy forest requires full site occupancy by each community layer (trees, shrubs, herbaceous) and a diversity of species. The disruption of native communities by deer browsing and replacement with exotic species spread via deer droppings can alter nutrient cycling pathways.

Investigation Of Partial Saturation Ebb And Flood Watering Systems: Potted plants can be watered by sub-irrigation or ebb and flood watering, whereby water is supplied through the base of the pot by flooding the bench or floor on which the pots sit. Ebb and flood watering combats the waste of water and fertilizer in traditional overhead watering systems used in greenhouses for production of potted ornamental plants. All of the water that is not taken up by plants is recycled to a reservoir for use in the next watering cycle.

Partial Saturation Ebb and Flood Watering can improve plant quality and reduce runoff to our aquifers.

However due to their slow fill and drain times, current ebb and flood watering systems achieve nearly 100% saturation of the root medium for each watering cycle. Geremia Greenhouse of Wallingford CT, refined the plumbing for water delivery and return systems to allow ebb and flood watering of short duration. We call this Partial Saturation Ebb and Flood Watering (PSEFW). This system can water plants with only partial saturation of the root medium. Plant quality is improved without the addition of chemical growth regulators. **Dr. Martin Gent**, in collaboration with **Geremia Greenhouse**, conducted precise measurements to determine various factors related to this refinement of irrigation for greenhouse crops

Partial Saturation Ebb and Flood Watering (PSEFW) restricted the amount of water added at each watering event, and improved plant quality without the addition of chemical growth regulators. Among commercial growers in Connecticut, only Geremia Greenhouse has converted or acquired a substantial area using PSEFW watering.

Impact: Several of the largest ornamental flower growers in Connecticut already water a significant fraction of their greenhouse area using ebb and flood watering. These growers are likely to design new greenhouse areas with the PSEFW refinement of ebb and flood watering to obtain the benefits of: greater control of plant growth; improved use of water and fertilizer; and improved plant quality. The

cost of more powerful pumps and more complicated plumbing required with PSEFW would be offset by greater income from improved crop quality, or the ability to hold a crop until the market price is optimum.

Leaf compost can reduce fertilizer use

Sheet Composting of Oak and Maple Leaves: Many municipalities in Connecticut with leaf collection programs in the fall are turning to farmers to dispose of their leaves. However, not all farmers have extra land to set aside for a standard composting operation. Instead, they layer undecomposed leaves on their fields and simply plow them under. This is called sheet composting. Nitrogen deficiency can be a problem in these soils because microorganisms involved in leaf decomposition use nitrogen more efficiently than plants. There is some question whether the differences in the rates of decomposition between oak and maple leaves would lead to differences in plant response when these leaves are used in a sheet composting operation. This is also a situation that confronts many home gardeners who have a predominance of oaks in their backyards.

To help answer this question, **Dr. Abigail A. Maynard** conducted a sheet composting experiment in which plots were amended with either all oak or all maple leaves. Undecomposed leaves were layered about 6 inches thick in the falls of 1994-2005 and incorporated into the soil by rototilling. Yields of lettuce, peppers, onions, and leeks were compared to yields from the control plots where no leaves were added. All plots received the same amount of 10-10-10 fertilizer applied at the recommended rate for vegetable production (1300 lbs/A). In 2006, lettuce yields were virtually the same for all the

treatments with heads averaging 1.1 lbs from all plots. The unamended control plots averaged the greatest pepper yields (3.7 lbs/plant) compared to plots amended with oak leaves (3.5 lbs/plant) or maple leaves (3.3 lbs/plant). The greatest onion yields were from plots amended with either oak or maple leaves (8.4 lbs/plot) compared to the unamended controls (7.8 lbs/plot). The unamended control plots averaged the greatest leek yields (8.0 lbs/plot) compared to plots amended with maple leaves (7.6 lbs/plot) or oak leaves (6.1 lbs/plot). It appears that applications of oak or maple leaves are not very deleterious to vegetable production but the experiment will be continued to determine the effect of repeated applications of oak or maple leaves.

Heirloom tomatoes come in variety of colors

Heirloom Tomato Trials: Interest and sales of heirloom tomatoes have increased dramatically in the past 10 years. More and more consumers are willing to forego appearance for that real old-fashioned tomato taste. Knowledge of high yielding cultivars and cultural details would benefit growers, especially those who serve inner city consumers who purchase these vegetables at local farmers markets throughout the Northeast. But growing heirloom tomatoes can be a challenge. Heirlooms tend to have poor disease resistance and have lower yields when to compared to hybrid tomatoes. They are also more susceptible to cracking due to their tender skin. In 2006, **Dr. Maynard** evaluated ten supersteak cultivars of ethnic heirloom tomatoes for yield and quality at Windsor and Mt. Carmel. At Windsor, yield of Wins All and Amana Orange were greatest (32 and 31 lbs/plant, respectively) with Hillbilly averaging 29.0 lbs/plant. Wins All produced the largest fruit (13 oz/fruit) with German Johnson Pink, Dinner Plate, and Amana Orange averaging 11 oz/fruit. Results at Mt. Carmel were similar. These trials will continue in 2007.

Cauliflower Trials: Recent developments in the fast-food industry to provide low-carbohydrate foods to diet-conscious consumers prompted a replacement of mashed potatoes with mashed cauliflower. Forty-seven cultivars were evaluated for yield and quality between 1986-1994. Most of those cultivars are no longer available from seed companies. To evaluate yield and quality of cauliflower cultivars that are currently available, **Dr. Maynard** field tested 13 cultivars of cauliflower for yield and quality in the past decade.

Impact: During this reporting period, average yield of the cultivar Attribute was greatest (6.5 tons/acre), followed by with Cassius, Briljans, Freedom, Minuteman, and Ravella exceeding 5.2 tons/acre. At a retail price of $2.00/head, there is a potential crop value of $19,360/acre. High yields of a quality product will benefit local growers and consumers by providing revenue for farmers and food producers, a nutritious food for consumers, and preservations of farmlands.

Jilo – Moisture Conservation Trials: 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 has become a minor crop. Its principal

use is in vegetable stew (ratatouille) and sweet and sour mixes with chicken and pork. In 1998, a Bethel grower obtained seeds from a member of the Brazilian community in the Waterbury-Danbury area (estimated population 4500). The Connecticut Department of Agriculture obtained some of the seeds and sent them to the Experiment Station for further testing. We found that jilo grows well in Connecticut's climate and can produce up to 11 lb/plant when mulched with black plastic to warm the soil. We also found that jilo flowers abort when subjected to moisture stress. In this experiment, use of plastic mulch or drip irrigation to improve the moisture content of the soil throughout the growing season to prevent fruit abortion was compared to untreated controls. At Mt. Carmel (loamy upland soil), average yield of fruit from Comprido Verde Claro was 5.6 lb/plant in plants grown with black plastic mulch and 4.9 lb/plant with drip irrigation compared to 5.2 lb/plant in control plots. In the summer of 2006, there was sufficient rainfall throughout the growing season so that drip irrigation was not necessary.

Calabaza – Selection for Early Maturity: Calabaza squash, also known as tropical pumpkin, is mostly grown in tropical and semi tropical climates. Calabaza is highly prized by consumers of Hispanic origin. It was identified by the Connecticut Department of Agriculture as one of the most sought-after vegetables at Connecticut's 88 farmers' markets. We are developing a cultivar that produces fruit on shorter vines by saving seeds from plants that have produced fruit within 2 feet of the plant. These seeds are planted at Lockwood Farm and Windsor and selections are again made. Fruit that matures on short vines is appealing to northern growers because the majority of fruit can mature before frost. Fruit that forms on longer vines do not always reach maturity. Last year, 60% of the plants at Windsor produced fruit within 2 feet of the plant compared to 43% of the plants at Lockwood Farm. Selections will continue for several more years.

Japanese plums and beach plums can be profitably grown in Connecticut

Specialty Fruit Variety Trials: 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 available for consumers. Thus, many growers are interested in adding minor specialty fruits to their operations. In 2001, Dr. Maynard established trials of Japanese plums at two locations. These trials include 12 cultivar/rootstock combinations.

Impact: The greatest yields were from Shiro at 62.8 pounds/tree. Fortune had the largest plums (2.4 oz/plum) and more attractive for marketing purposes. At an average yield of 35 pounds/tree and a suggested retail price of $2.25/lb, a planting of 242 Fortune trees per acre would yield a potential crop value of $19,060/acre. The immediate impact is that quality plums can be produced in Connecticut. Long-term benefits include diversification of fruit products and greater profits for growers.

At the request of fruit growers, 206 beach plums seedlings were planted during 2003 on two experimental research farms. These seedlings represented different cultivars that were initially raised at Cornell University and were comprised of original collections made from 35 sites from Maine to Delaware.

Impact: Heavy yields of 28 pounds/plant were recorded for beach plums. At a retail price of $2.00/lb, there is an expected crop value of $40,660/acre. The immediate impact is that growers at two of Connecticut's largest farms are now growing beach plums, which are in consumer demand because of premium jams ($6.40/8 ounce jar) that can be produced from this fruit.

Personal-sized Watermelons Trials: The newest melons on the marketplace are seedless miniature "personal" watermelons, weighing 3-7 pounds each. Personal-sized watermelons offer an attractive alternative for small families or for consumers that have limited refrigerator space. Beside the smaller size, they also have a thinner rind, which reduces waste. In addition, researchers have found that lycopene and beta-carotene contents are abundant in personal-sized watermelons. Lycopene, an antioxidant, has been linked to the possible prevention of cancer and heart disease. In 2006, **Dr. Maynard** evaluated six cultivars of personal sized seedless watermelon for yield and quality at Windsor and Mt. Carmel. At Windsor, average yield of plants mulched with black plastic was 28 T/A compared to 17 T/A from the unmulched plots. Mulched plots averaged 2.3 melons/plant compared to 1.4 melons/plant on unmulched plots. Miniput had the greatest yields (37 T/A) followed by Vanessa (23 T/A) and Poquito (22 T/A). At Mt. Carmel, mulched plots averaged 22 T/A compared to 19 T/A from the unmulched plots. Mulched plots produced 1.8 melons/plant compared to 1.5 melons/plant from the unmulched plots. Valdoria (25 T/A) and Poquito (24 T/A) had the greatest yields. Petite Treat had the greatest sugar content with an average Brix of 12.7 compared to Poquito (12.3) and Miniput (12.0). All other cultivars at both sites had Brix readings under 12. Research will continue with evaluations of additional varieties and various cultural methods.

Garlic Trials: Garlic, a bulbous plant closely related to the onion, has a wide number of market niches and is used in great quantities for cooking. Consumption of garlic in the U.S. has risen from 0.5 pound per person in 1985 to 3.1 pounds per person in 1999. The increased popularity of garlic in ethnic foods and use in restaurants has led to increased demand. In addition, there have been numerous news releases describing the health benefits of garlic. To meet that demand, acreage devoted to the production of garlic rose from 16,000 acres to 41,000 acres, or about a 156% increase. No other vegetable, including popular vegetables like onions, broccoli, and carrots, has exhibited such strong sustained growth. In 2005, **Dr. Maynard** initiated garlic variety trials by planting 6 cultivars in October. These bulbs were harvested in July 2006 and evaluated for yield, quality, and storage durability.

Impact: Inchelium Red had the greatest yields (1960 lbs/acre) followed by Siberian and Polish Jenna both averaging 1700 lbs/acre. At a retail price of $2.50/lb, there is a potential crop value of $4,270/acre in Connecticut. Growers on small farms are planting garlic for local markets. The long-term benefits include additional revenue

for farmers in rural areas and providing a product that has growing consumer demand. In addition, there may be health benefits for those who consume garlic.

Connecticut vineyard in winter

Winegrapes. Studies were initiated in 2004-2006 to help determine cultural practices for growing high quality winegrapes profitably in Connecticut. The wine grape industry in Connecticut is rapidly expanding. The first Farm Winery in the state opened in 1979, and there are currently 22 wineries with a Farm or Commercial Winery license, with 2 or 3 more scheduled to open in the foreseeable future. The existence of these wineries adds substantially to local economies, as local restaurants, hotels, bed and breakfasts, etc. receive increased business due to their proximity. The Connecticut Wine Trail brochure, published by the Connecticut Vineyard and Winery Association, is the most popular brochure in Department of Tourism travel offices.

Wine grape growers and Farm Wineries face several challenges. Farm Wineries are required to grow a minimum of 25% of the fruit in their total output, but are having trouble meeting this standard. Consecutive very cold winters in 2003 and 2004 resulted in significant plant loss on less cold hardy varieties, and have driven up prices for purchasing Connecticut and out-of-state fruit. Little information is available to growers regarding cultural information for growing more cold hardy and disease resistant hybrid varieties in the state. Disease management is critical during the growing season due to Connecticut's warm, humid summers. The industry requires increased production via better management practices in existing vineyards and improved variety selection in newly planted vineyards.

Cultural practices in Vitis vinifera. **Dr. William R. Nail** established a planting of 288 Pinot Gris vines at Lockwood Farm in summer 2004. Two different rootstocks were used: 3309C, the most commonly planted rootstock, and 101-14, which may tend to ripen fruit earlier and have better tolerance to severe winter freezes. The first (small) crop of grapes was harvested in 2006, and cultural experiments will be initiated in 2008 to determine better strategies for optimum yield and fruit quality. Vines will be monitored for several years to observe incidence and severity of crown gall, whose symptoms sometimes do not appear until one to two years after a significant freeze event.

Impact: Vines grafted to 101-14 rootstock had 32% less mortality due to winter freeze damage than those grafted to 3309C. Planting vines on rootstocks more resistant to winter damage can result in savings of $7.40 for each year of lost production per vine, plus $3.50 replacement cost plus labor involved in removing diseased vines and replanting. These preliminary results suggest a savings of $1,400/acre during the first three years of establishing a new vineyard.

Cultural methods for reducing cluster compactness. Harvest rots are a major problem if weather conditions are favorable for disease development between veraison and harvest. Based on field tests, the increased susceptibility of tight-clustered cultivars and clones is a result of cluster compactness. Reducing photosynthesis by leaf removal at bloom has been shown to reduce fruit set, resulting in looser clusters. However, since the leaves are permanently removed, this reduction in photosynthesis can have negative consequences for bud fruitfulness in the subsequent growing season. Studies with the herbicide Terbacil have shown that by temporarily reducing photosynthesis, fruit set can be reduced with no long-term negative consequences. Terbacil is not labeled for such a use, and it is extremely unlikely that a grower would confidently apply an herbicide to his or her crop if it were. JMS Stylet oil is labeled for use on grapes as a fungicide and insecticide, and is used by many growers, especially organic ones. It has been shown to slightly reduce photosynthesis, and can result in lower fruit soluble solids if over applied.

Training increases grape quality and yield

Dr. Nail applied JMS Stylet oil during bloom of 2006 and 2007 to selected Pinot Gris vines. Single leaf photosynthesis measurements were made before and after application. Flower primordia on clusters opposite measured leaves were counted. Photosynthesis was reduced by 18% the day after oil application compared to vines sprayed with water only, and fruit set on treated vines was reduced by 20%. The experiment will be continued for at least one more year to ensure that there are no negative effects of this practice.

Effects of graft union height. Freeze damage to grafted grapevines frequently occurs at the graft union, which is typically very close to the ground. Crown gall frequently occurs on freeze-damaged vines, although symptoms may not appear for one or two years after the freeze event. Elevating the height of the graft union may result in less injury. In 2006, Chardonnay clone 96 budwood was grafted onto 3309C rootstock at standard height and 26 inches higher. The vines were transplanted in spring 2007 to vineyards at Lockwood Farm and Westport, Massachusetts. Vines will be evaluated for vine performance, winter survival, and crown gall incidence and severity in subsequent years. Vines with crown gall typically require replacement. Funding for this project was obtained from the Viticulture Consortium East.

Impact: Vines requiring replacement result in average losses of $7.40 per year for three years due to crop loss, $3.50 for replacement vines, plus labor in removing infected vines and replanting. High-grafted vines may result in significant reduction in such losses, which would be approximately $2,070 plus labor per acre for each 10% of vine mortality.

Spacing and training in hybrid varieties. Grapevines in many older vineyards in Connecticut are planted on six foot spacing and trained to a vertically shoot positioned system. This has generally worked well for most vinifera cultivars and many hybrids.

Recently released hybrid cultivars that are rapidly finding favor frequently have different growth habits that make them unsuitable for this traditional spacing and training.

Pruning young grapes in late April

Within-row spacing of grapevines in the vineyard is one of the most critical decisions to be made at planting. Too close spacing results in excessive competition and excessive vegetative growth, leading to reduced yields of poor quality fruit. Spacing that is too far apart results in unproductive utilization of valuable vineyard space. The choice of spacing is permanent; however, errors made at planting can sometimes be partially remedied by dividing the canopy to accommodate vine growth. Divided canopies can increase yield per foot of row length, but are more difficult and labor-intensive to establish and maintain.

Dr. Nail established a new planting of the hybrid varieties St. Croix, Cayuga White, and Traminette in May, 2005 at a private grower's vineyard in Wallingford. St. Croix and Cayuga White are among the most widely planted red and white varieties, respectively, in the state, and Traminette is a relatively new release from the Cornell breeding program which shows much promise. Hybrid varieties have different growth habits and management issues than vinifera cultivars, which may involve fundamental issues both before and after planting. Plants of all three varieties were planted at 6 and 8 foot spacings, and will be grown on different training systems: low wire, Vertically Shoot Positioned (VSP), Hudson River Umbrella (HRU), Geneva Double Curtain (GDC), and a vertically divided canopy system such as Scott Henry. Those on 6 foot spacing will also be pruned to both cane and cordon systems. The results of this study will allow both new and existing growers to help maximize their production, as well as possibly demonstrating that some systems are not efficient in Connecticut.

*Pruning systems***.** Most grapevines in Connecticut have traditionally been cane-pruned. Cane pruning requires skilled labor, which is increasingly short supply. Spur pruning to a cordon system requires less skilled labor and lends itself to mechanization. A planting of Seyval Blanc, Chambourcin, Villard Blanc, and Villard Noir at Lockwood Farm was rejuvenated in 2004, and vines were either cordon or cane pruned in 2005 and 2006 to compare the relative efficiencies of these pruning methods. Yield and fruit quality parameters were determined beginning in the 2005 harvest season at Lockwood Farm.

Impact: Initial data suggest that cordon pruning is a viable alternative to the cane pruning used in most Connecticut vineyards. Skilled labor costs, essential to cane pruning, are approximately 30% higher than unskilled labor costs. Of equal importance is the increasing unavailability of skilled labor. Vines will need to be monitored through the 2008 growing season to determine if there are differences in long-term vegetative or fruit quality parameters that may influence a grower's decision.

Table grape demonstration plot. **Dr. Nail** established a new planting of four cultivars of seedless table grapes at Lockwood Farm in 2006. Beginning in 2008, the grapevines will be trained to different training systems and will be used for pruning and training demonstrations in subsequent years.

Cultivar and clonal evaluation. Previously established experimental plots at two private grower's vineyards and the Valley Laboratory were evaluated beginning in 2004. One vineyard was established to compare Cabernet Franc, Merlot, and Cabernet Sauvignon. Cabernet Sauvignon has displayed high vine mortality and poor fruit quality due to lack of maturity. Cabernet Franc and Merlot both produced good quality fruit, although yields in Merlot were slightly lower. While there have sometimes been differences among clone and rootstock performance, the effect of growing season was the greatest factor contributing to yield and fruit quality. Another vineyard compared several V. vinifera and hybrid varieties. Hybrids outyield most vinifera varieties. Data from this vineyard will also be collected through the 2007 growing season. Riesling fruit is consistently less mature at harvest than any other white variety, indicating the need to harvest it later than other varieties or, if all varieties are treated the same, to consider not planting it.

Harvesting grapes in October

A new study will be established at Lockwood Farm and the Valley Laboratory in spring, 2008 to compare cultivars of V. vinifera and hybrids. This study is coordinated with researchers from other states throughout the country as NE-1020: Multi-State Evaluation of Winegrape Cultivars and Clones. This project should help answer the questions "What are the criteria for selecting a particular variety?" and "What cultivar(s) is(are) most suited to my situation?"

*Cultivar and clonal evaluation***.** Previously established experimental plots at Lockwood Farm, the Valley Laboratory, and two private grower's vineyards were evaluated beginning in 2004. The planting at Lockwood Farm contains only hybrid cultivars. One private vineyard was established to compare the *Vitis vinifera* cultivars Cabernet Franc, Merlot, and Cabernet Sauvignon. The plots at the Valley Laboratory and the second private vineyard compared different *V. vinifera* and hybrid varieties.

Cabernet Sauvignon has displayed high vine mortality and poor fruit quality due to lack of maturity. Growers have generally agreed that this cultivar is unsuitable for Connecticut conditions, and no significant new plantings are being established. Cabernet Franc and Merlot both produced good quality fruit, although yields in Merlot were slightly lower (4.2 vs. 3.9 tons/acre, respectively). While there have sometimes been differences among clone and rootstock performance, growing season effects are greater.

Data from these vineyards will be collected through the 2007 growing season. In each year, Riesling fruit was considerably less mature at harvest than any other white variety, indicating the need to harvest it later than other varieties or, if all varieties are treated the same, to consider not planting it.

A new study will be established at Lockwood Farm and the Valley Laboratory in spring, 2008 to compare cultivars of *V. vinifera* and hybrids. This study is coordinated with researchers from other states throughout the country as NE-1020: Multi-State Evaluation of Winegrape Cultivars and Clones. This project should help answer the questions "What are the criteria for selecting a particular variety?" and "What cultivar(s) is(are) most suited to my situation?"

Impact: At the Valley Laboratory and at the second private vineyard, white hybrid cultivars yielded slightly more than most white vinifera cultivars, 5.5 vs. 4.7 tons/acre, respectively. There were no significant differences between hybrid and vinifera red cultivars. This suggests that vinifera cultivars are a viable option for vineyards not susceptible to winter freeze damage, as prices for vinifera averaged $1,380/ton vs. $700/ton for hybrids. Thus, white vinifera cultivars have a potential market value of $6,500/acre vs. $3,800/acre for white hybrid cultivars.

GRANTS AND CONTRACTS OFFICE

The Grants and Fund Raising Office was established in January 2007 for the purpose of increasing funding opportunities for the Station from the government, corporate foundations, and private foundations. **Tess Foley** is the Grants and Contracts Manager for the Station. In this capacity, Ms. Foley initiates and manages grant proposal submissions for federal, state, and regional government funding opportunities; as well as establishes relationships with major corporate foundations and private foundations for the purpose of securing foundation support.

In the first 5.5 months in this position, Ms. Foley assisted in preparing and submitting 43 grant proposals for Station scientists totaling over $4.5 million in grant requested funding. Additionally, Ms. Foley executed a direct mail campaign to over 300 corporate contacts and major trade associations nationwide to generate awareness of the Station's research and promote current funding opportunities to these potential sponsors. She is leveraging her existing business contacts with executives at the president and CEO level to build awareness of the Station and open new opportunities for funding. The Grants Manager is also building awareness of the Station and generating new business contacts by attending corporate networking events. The Grants Office has received direct correspondence acknowledging the Station from executives of leading companies and organizations including AARP, Sikorsky Aircraft Corporation, First Light Power Resources, Ford Motor Company, Scholastic, Produce for Better Health Foundation, The Center for Science in the Public Interest, Partnership for Food Safety, VNU Publishing, American Academy of Pain Management, Pepsi Cola Company, and Binney and Smith.

The Grants Manager works with all Station scientists to promote awareness of their research work and generate new funding sources to support their work. Tess Foley hosted a presentation meeting for interested executives from Sikorsky Aircraft Corporation (a subsidiary of United Technologies Corporation) to present Station scientists' research for consideration of funding of phytoremediation, wetland dieback, and biofuels research. Station scientists were then invited to present their research at

Sikorsky Aircraft Corporation's Earth Day Celebration event. Participating research areas were: West Nile Virus, Lyme Disease, Wetland Dieback, Biofuels, Invasive Aquatic Plants, Phytoremediation, and Forestry. Proposals have been submitted to government funding sources including the National Science Foundation, the Environmental Protection Agency, the Department of Housing and Urban Development, the Natural Resources Conservation Service, and Sustainable Agriculture Research and Education. Grant proposals were also submitted to corporate foundations including First Light Power Resources, Ocean Spray Cranberries, Kraft North America, and the Western Grower's Association. Research topic areas that have submitted grant proposals for potential funding include: invasive aquatic plant program, phytoremediation, biofuels, wetland dieback, hybridization development to combat oriental chestnut gall wasp, pollinator decline, Lyme disease, indoor fungi, lead determination in community gardens, and ethnic crop development.

The Station is in the process of establishing The Connecticut Agricultural Experiment Station Research Foundation, which will function as an official 501(c)(3) non-profit organization. This status will greatly assist the Station with the opportunity to seek additional research funding from new sources.

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

The Department of Plant Pathology and Ecology conducts research to understand the biology and ecology of plant pathogens and interactions between plants, pathogens, and the environment. We also diagnose plant health problems for our stakeholders. Our mission is to manage plant health problems using innovative methods to protect the environment, ensure a safe food supply, and maintain a healthy landscape for Connecticut.

Scientists in the Department of Plant Pathology and Ecology are involved in both service and research activities**.** Our service efforts focus on the diagnosis of plant health problems for all Connecticut residents, including homeowners, plant care professionals (e.g., arborists, landscapers, garden centers), and commercial growers (e.g., greenhouse, vegetable, nursery, orchard, and vineyard crops). We work closely with professionals and homeowners to develop disease management programs that require minimal use of pesticides and are compatible with the environment. The Department of Plant Pathology and Ecology has an active outreach program, which offers numerous fact sheets, web-based information, workshops, and presentations for grower groups, garden and horticultural clubs, special interest groups, and students. Our research efforts include original, basic investigations in many areas of plant pathology including the ecology and genetics of plant pathogens, new and emerging diseases, and models for predicting the spread of plant pathogens. These studies focus on, but are not limited to, the needs of Connecticut stakeholders.

RESEARCH ACTIVITIES

Chestnut breeding for orchard and timber trees

Dr. Sandra Anagnostakis is planting chestnut hybrids with resistance to chestnut blight disease in forest clear-cuts. She is also continuing to treat the native American chestnuts in the area with hypovirulent strains of the chestnut blight pathogen in order to keep them alive. By planting these trees in close proximity, it will allow crossing to occur between the hybrids and the native trees. Our goal is to obtain a population of timber chestnut trees resistant to blight and adapted to the local niche. Seed from 2005 was raised for us by a nursery in Georgia, and one-year-old seedlings were planted this spring in three locations: the Goodwin State Forest, the Farmington Town Forest, and at our substation in Windsor. The Farmington Town Forest has heavy soil and survival there will be carefully monitored. This year, new crosses are being made in order to obtain more detailed information on the genetics of chestnuts. This seed will be sent to molecular biologists in North Carolina who will extract the DNA and make a genetic library. We will collect seed from our Windsor planting for selection of timber trees. In addition, crosses of some of our better nut-producing trees are being crossed to produce seed for determination of the nutrients in the nuts.

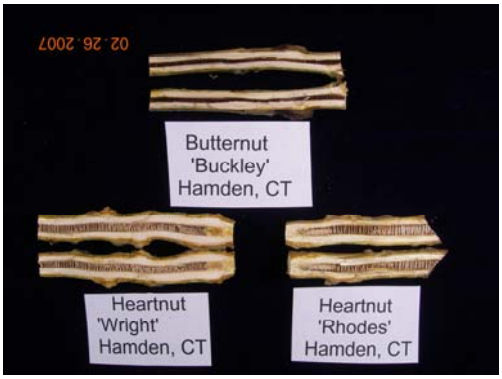
Impact: Chestnuts were once important timber trees in Connecticut, and our timber hybrids should allow chestnut lumber to again be a product here. Many small growers with orchards in the state could benefit from the addition of chestnuts to their produce. Finding better cultivars will improve their sales.

Cornelia Pinchot in a truck bucket, pollinating 'Mahogany' Chinese chestnut in The Chestnut Plantation at Sleeping Giant.

Sandra Anagnostakis and State Foresters at the Goodwin State Forest planting hybrid chestnuts.

Butternut trees in Connecticut

Butternut populations are declining throughout the native range, due to an exotic fungus, *Sirococcus clavigignenti-juglandacearum*, that causes lethal cankers. **Dr. Anagnostakis** has been studying this important disease and, to date, has only isolated this pathogen twice from butternuts in Connecticut. Since butternut readily hybridizes with Japanese walnut, many hybrids are found throughout the state, and it is very hard to tell pure butternuts from the hybrids. We need to be able to distinguish hybrids from true species since Japanese walnuts have been reported to be resistant to butternut canker. If so, we might be able to transfer resistance to butternut trees by crossing them with Japanese walnuts. To accomplish this, we are cooperating with a molecular biologist at Notre Dame to develop DNA markers that will allow us to determine if we are dealing with hybrids or true species. We are also working with cooperators in Tennessee who are propagating trees that exhibit resistance to butternut canker, and who are using them in their breeding program for restoration efforts. We have planted some of their seedlings in the Mattatuck State Forest to check for disease resistance and fitness in Connecticut. When these trees were examined for survival this spring, we found cankers caused by a different fungal pathogen. This fungus has been identified as a species of *Phomopsis* that has been reported in Japan, but not in the United States. Studies to further characterize this new species are ongoing.



One method used to distinguish hybrids from true species uses characteristics of the pith in twigs. The pith of butternut twigs is dark brown and densely chambered, whereas Japanese walnut (Heartnut) twigs have light brown pith with less dense chambers.

Impact: Butternuts are a minor species in Connecticut, but the wood is valuable for lumber and woodworking. Our results will help us decide whether planting hybrids would be useful here.

Quantifying cross fertilization in maize

Maintaining a high level of seed purity is a major concern in seed production fields. Maize (corn) is wind-pollinated and seed purity in maize is determined, in large part, by pollen movement between plants in the field, which can lead to cross fertilization between plants of different types. Cross fertilization (also known as outcrossing) in maize depends on several factors including: a) the relative timing of pollen shed and silk

development on plants in the field, b) the aerial transport of pollen from tassels to silks, and c) the relative fertilization efficiency of competing types of pollen, once deposited on silks. **Dr. Donald Aylor** is conducting tests and developing a model to quantify outcrossing in maize. Outcrossing was assessed in a field of yellow-seeded maize and white-seeded maize, planted in contiguous blocks containing a different number of rows of each type. Outcrossing percentage was determined by counting white and yellow kernels on individual ears in each row of the white-seeded type. The alternating planting pattern used resulted in a cyclical pattern of outcrossing with a highly significant effect of row separation. The model calculations were compared with data from this field study and from the classic outcrossing study of Jones and Brooks done in the 1950's. The model predictions were significantly correlated both with the present observations and with the classic study. The model yields a physically-based interpretation of the effects of distance, time, and border rows on outcrossing potential, indicating that the model may have utility for analyzing or designing studies of cross pollination in maize and other wind-pollinated species. A main strength of the combined modeling and experimental approach is that it can be used to examine a wide array of conditions and planting schemes.

Two varieties of corn, one white-seeded (whitish-colored tassels) and the other yellow-seeded (maroon-colored tassels), were planted alternately in a series of contiguous blocks at Lockwood Farm, with each block containing a different number of rows. Cross fertilization was determined by counting yellow and white kernels separately on individual ears in each row of the white-seeded type.

Impact: The model of aerial dispersal of corn pollen being developed here will enable objective evaluations of the risks of off-site pollen movement. This model provides a framework for: improving strategies for regulating off-site gene flow, estimating the potential off-target effects of genetically modified (GM) pollen, and estimating the impact of off-site movement of GM pollen on the potential marketability of non-GM corn. Applications of the model include establishment of isolation guidelines for field testing new genetic traits incorporated into open-pollinated plants and for maintaining purity in hybrid seed production, evaluation of regional cropping plans involving neighboring conventional and organic farms, prediction of the impact on international marketability of non-GM corn, and as a tool to inform regulatory decisions concerning GM crops.

Biocontrol with earthworms

Over the past two years, **Dr. Wade Elmer** has shown that earthworm activity is associated with the suppression of soilborne diseases. It is already known that earthworms enhance soil properties by processing organic matter, facilitating water infiltration, and breaking up hardpans with their burrows, which may go a meter deep. More importantly, we have learned that earthworm castings are rich in microbes that can reduce root disease. Past greenhouse experiments established that earthworm activity could reduce Fusarium crown and root rot of asparagus caused by *F. oxysporum* f. sp. *asparagi* and *F. proliferatum*, and Fusarium wilt of tomato caused by *F. oxysporum* f. sp. *lycopersici*. In 2006, field plots were established with eggplants to study the influence of adding earthworms to soil on growth, yield, and Verticillium wilt. When earthworms were applied at the rate of 15 earthworms/m^2, growth was increased by 20%, yield was increased by 13%, and disease severity ratings were reduced by 21% when compared to plots that received no earthworms. The study is being repeated in 2007.

Impact: Understanding how earthworm activity affects root health may improve efforts to protect plants without the use of chemicals or fumigants.

Fusarium ecology --Corn stubble survey

A long-term study on the incidence of *Fusarium graminearum*, a fungus that produces carcinogenic mycotoxins in grain, was continued in 2006-2007 by **Drs. Elmer** and **Ferrandino**. We found in past years that *F. graminearum* represented approximately 30% of all isolates and was the largest group on corn stubble. Molecular analysis of the *F. graminearum* isolates was performed by Drs. Kerry O'Donnell and Todd Ward of the NCAUR Center of ARS, USDA in Peoria, IL. They found that a small percentage of the isolates in Connecticut represented a unique chemotype called 3-ADON. The remaining isolates belong to the more common 15-ADON chemotype. Assays done by Drs. O'Donnell and Ward also found that the 3-ADON chemotype could produce approximately 2.5 times as much mycotoxins as those with a 15-ADON chemotype. In addition, the 3-ADON isolates had significantly higher radial growth rates, produced significantly more conidia, and produced conidia that reached maturity significantly faster than 15-ADON isolates. Given these selective traits, we hypothesized that the more toxic 3-ADON isolates might increase on Connecticut's cornfields faster than the 15-ADON isolates. Six corn farms were again selected and sampled in December 2006 using a fractal sampling scheme. Over 1400 isolates of *Fusarium* were identified to species in 2006. All isolates identified as *F. graminearum* (32% of the total) were sub-cultured from single spores and 100 representative isolates were sent to Drs. O'Donnell and Ward to be typed using multilocus genotyping assay. The percentage of 3-ADON isolates has held relatively constant at 18, 21, and 19% for 2004, 2005, and 2006, respectively. Although no apparent increase seems to be occurring, spatial analyses will be conducted by Dr. Ferrandino to determine if the 3-ADON isolates are clustered in the field or randomly distributed.

Impact: Understanding the incidence and relative distribution of the 3-ADON isolates of *Fusarium graminearum* will assist us in predicting whether or not this chemotype is increasing in Connecticut.

Ornamental disease research

Gladiolus--Fusarium corm rot of gladiolus is caused by *Fusarium oxysporum* f. sp. *gladioli* and is the most destructive root disease of gladiolus. In previous work, **Dr. Elmer** found that a 20-min soak of corms in 50 ppm of Actigard 50 WP (a.i. acibenzolar-s-methyl) provided season-long suppression of Fusarium corm rot. However, Actigard 50 WP is not registered on ornamentals. In 2006, experimental field plots were established to determine the effect of increasing rates of Actigard 50 WP on the number of flower spikes and on disease severity. Rates of 0, 25, 50, 100, 200, and 500 ppm were tested. Phytotoxicity was observed at 200 ppm, but the horticultural quality of the flower spikes was not affected. Disease severity was not affected in 2006, but the phytotoxicity observed at the higher rates may have disguised the disease symptoms. The Actigard 50 WP rate of 500 ppm resulted in the largest number of flower spikes. The experiment is being repeated in 2007 and will include ratings on the corms in conjunction with foliar ratings to help separate the phytotoxicity from the disease symptoms.

Impact: Because Fusarium corm rot is extremely difficult to control and highly resistant cultivars are rare, the strategy of soaking corms for 20 min with Actigard 50 WP may provide an economically efficient management tool resulting in minimal chemical contact and reduce exposure to the environment. Dr. Elmer is making attempts to get Actigard 50 WP registered on gladiolus.

Coreopsis--A coreopsis grower in Michigan sent wilting plants to two separate diagnostic clinics in New York and Indiana. Both clinics found *Fusarium* spp. and requested **Dr. Elmer** to assist in identifying the species and conducting pathogenicity tests. Five isolates that were sub-cultured from single spores were found to be vegetatively compatible isolates of *Fusarium oxysporum*. Pathogenicity tests were conducted in the greenhouse. Two methods of inoculation were used. Method one (conidial drench) involved pouring 100 ml of conidial suspension (10^6 conidia/ml) into 10-cm pots containing one healthy two-mo.-old division of the same cultivar that was obtained from a different nursery. Method two (millet infestation) involved mixing autoclaved millet seed that had been colonized by each isolate into potting mix (2.5 g/L mix) prior to transplanting. Four plants were tested per isolate per method and controls received distilled water or autoclaved millet. After 3 mo., only two isolates inoculated by conidial drench caused root rot, whereas all isolates inoculated by millet infestation caused wilt, root rot, and vascular discoloration, and all inoculated plants died after 3.5 months. The controls remained healthy. The fungus was recovered and was vegetatively compatible with the original *Fo* isolates. The tef-α gene from 2 *Fo* isolates was sequenced by Dr. M. M. Jimenez-Gasco at the Pennsylvania State University, University Park, PA, and submitted to the Blast ID search at Pennsylvania State University. The coreopsis pathogen belonged to the *Fo* species complex. Two isolates have been deposited at the Fusarium Research Center at Pennsylvania State University under

deposition numbers O-2437 and O-2438. Host range studies are currently underway to determine if the coreopsis pathogens are specific only to coreopsis.

Symptoms of greenhouse-grown coreopsis plants affected by Fusarium wilt caused by *Fusarium oxysporum* (right) compared to healthy plants (left).

Impact: Because of the popularity of this coreopsis cultivar, this disease has the potential to cause significant economic loss in nurseries and landscape businesses. Careful surveillance of imported coreopsis plants is warranted.

Sudden wetland dieback

In the summer and fall of 2002, large areas of emergent vegetation at several sites along Long Island Sound began to disappear. The loss was mostly restricted to *Spartina alterniflora* and *S. patens*. This condition has been called Sudden Wetland Dieback (SWD). Although drought and rising sea levels have been implicated as primary stressors leading to SWD in New England, fungal pathogens, such as *Fusarium* spp., are associated with leaf spots and internal stem rot of declining plants. Affected plants from SWD sites in Maine, Massachusetts, Connecticut, New York, Virginia, Delaware, and Georgia were obtained by **Dr. Elmer** in 2006. Over 200 isolates of *Fusarium* spp. were collected and placed in storage. Among the isolates collected in New England, at least four distinct morphological types (morphospecies) were found among isolates. Over 100 isolates representing the four morphospecies were tested for pathogenicity by wound inoculating a stem of *S. alterniflora* below a node and inserting a colonized agar plug (4 mm diam.). Inoculation sites were examined 1 mo. later and stems were split open and inspected for internal discoloration. Reaction types were characterized as small lesions with no internal rot, internal rot below the node, but not above, and internal rot below and above the node. Pathogenic isolates were found in three of the four morphological groups. Although it is doubtful that *Fusarium* pathogens are a primary factor in SWD, our findings suggest that *Fusarium* spp. may contribute to SWD by limiting plant growth and vigor.

Dr. Marra has been collaborating with **Dr. Wade Elmer** in delineating the phylogenies of *Fusarium* species associated with salt marsh decline.

Field research technician, Peter Thiel, and summer assistant, Christina Connelly, transplant healthy *Spartina* grass at wetland dieback site at Hammonasset State Park in Madison as a family of Canada geese stroll by in the background.

***Impact*:** Loss of wetland flora like *Spartina* has drastic implications for coastal ecology and marine life, shellfish industries, and property values. These studies are the first to provide baseline information on plant pathogens in New England salt marshes.

The application of non-parametric statistics to describe distributions of plant disease and mosquito populations

Dr. Francis Ferrandino has been studying the effect of spatially and temporally aggregated plant disease data on the accuracy of disease assessment by sampling. The experimental result is a highly skewed distribution, dominated by a few "hot spots," with an abundance of leaves that have no disease. This sampling problem is much more general than plant disease epidemiology. Our world is characterized by clumps and temporal aggregates so that any study of the environment results in similarly skewed data. Recently, the results of this investigation have been applied to the analysis of mosquito population data obtained from trap catches over two-hour periods throughout the night. In both systems, the occurrence of multiple zeroes confounds the analysis. Simple parametric statistics lead to erroneous results due to the large number of zeroes. This results in a deflated variance leading to "apparently significant" effects that are specious. The solution to the problem is the use of non-parametric statistics based on rank instead of actual value for probabilistic inference (e.g., Kolmogorov-Smirnov test, Sign test, Median test).

Impact: The statistical analysis of mosquito catches and plant disease severity must be performed non-parametrically, since the data are highly aggregated over space, time or both.

Powdery mildew of muskmelon

Powdery mildew is an annual major problem on susceptible muskmelon plants. This pathogen has three races found in the United States (Race 1, Race 2, and Race 3). In order to study the epidemiology of the three races of this pathogen [*Podosphaera xanthii* syn. *P. fusca* (Castagne) U. Braun & Shiskoff, *Sphaerotheca fuliginea* (Schlecht.) Pollacci] in Connecticut, **Dr. Ferrandino** has planted a mixture of 5 muskmelon varieties at both Lockwood Farm, Hamden, CT, and at the Valley Laboratory, Windsor, CT, for the past two years (2006-2007). One of the muskmelon varieties is resistant to powdery mildew Races 1 and 2 ('Ambrosia' PMR45), one is resistant to Race 1 ('Burpee Hybrid'), and three other varieties ('Superstar,' 'Hale's Best,' and 'Delicious 51') have varying degrees of tolerance to the various races of the pathogen. Preliminary results indicate that, in 2006, there were three separate introductions of this disease, which occurred simultaneously (within a few days) in Hamden and Windsor approximately 45 miles apart. The first disease was observed on all three susceptible cultivars in the last week of July 2006. The cultivar resistant only to Race 1 of the pathogen ('Burpee Hybrid') remained free of colonies until the second week of August 2006. The cultivar resistant to both Race 1 and Race 2 of the pathogen ('Ambrosia') remained free of colonies until the first week of September 2006. The results of this first trial are being tested this summer.

Powdery mildew on a greenhouse grown muskmelon plant. By using different melon cultivars, it is possible to determine the race of the infecting fungus in these experiments

Impact: Powdery mildew is repeatedly introduced into Connecticut by episodic transport events involving different races of the pathogen.

Milk-based sprays to control powdery mildew

In the recent past, **Dr. Ferrandino** has studied the effects of using milk-based foliar sprays to reduce the economic impact of powdery mildew epidemics on pumpkins and muskmelon. Preliminary experiments also indicate that milk-based sprays are effective against powdery mildew on tomato and zinnia. What is interesting is that this disease is an obligate parasite and varies from host to host. This work is being extended to examine the efficacy of milk-based sprays as a control for powdery mildew on common ornamental plants used around the home. Common perennial landscape plants that suffer from powdery mildew are lilac, beebalm (monarda), phlox, deciduous azalea, aster, and

peony, and common annual ornamentals include zinnia, aster, and verbena. A long-term plot including all of these species is being established at Lockwood Farm in the summer of 2007. These plots will provide information over many seasons on the relative performance of chemical fungicides and environmentally-friendly mildew controls (milk, potassium bicarbonate, and light horticultural oil-based foliar sprays).

Milk-based foliar sprays (foreground) delay the onset of disease and reduce disease severity of powdery mildew on pumpkin plants. Note heavy disease levels on unsprayed buffer plants (upper left).

Impact: Milk-based foliar sprays have been found effective in controlling powdery mildew on pumpkin, muskmelon, tomato, and zinnia.

Studying plant disease epidemics

Dr. Ferrandino has been studying plant disease epidemics involving the Septoria-Tomato and the Powdery Mildew-Pumpkin pathosystems for the past 20 years. Both of these disease-host complexes involve very strong juvenile tolerance to disease. Young leaves are less likely to become infected than mature leaves. In addition, both of these host plants go through an incredibly rapid midseason growth spurt during which leaf area increases by a factor of 10 over a period of 5-6 weeks (usually mid July to late August). Thus, during this vegetative phase, host plants are composed of a dynamic mixture of varying aged leaves with a phenological variation in disease susceptibility.

Dr. Ferrandino has planted two 180-200-ft-long, north-south rows of tomatoes annually since 1989 at Lockwood Farm. These plantings are inoculated with *Septoria lycopersici* at the southern end and the resulting epidemic is monitored. Plant leaf area is estimated weekly and the growing tips are tagged bi-weekly so that disease evaluation can be correlated with the age of leaves.

The efficacy of milk-based sprays in controlling powdery mildew was tested in an experimental plot of zinnias and tomatoes. Infected leaves on this cut zinnia stem act as a source of inoculum of the powdery mildew-producing fungus. Cut stems were placed in paper cups containing water to extend their viability. Cups were taped to the top of a 5 ft. stake to encourage the dissemination of spores within the plot.

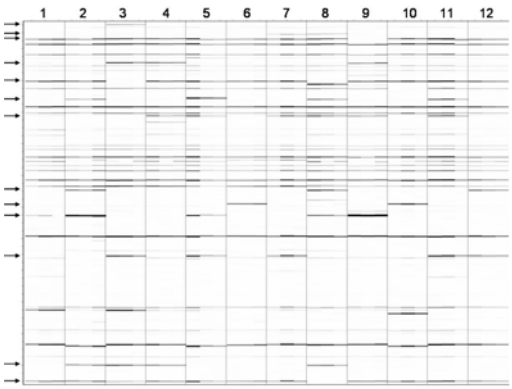
To examine this effect for powdery mildew on cucurbits, Dr. Ferrandino is examining disease development on bi-weekly sequential plantings of pumpkin, zucchini, gourds, and muskmelon to evaluate the relative susceptibility to powdery mildew of different aged leaves on different aged plants over the course of the growing season.

Impact: The dependence of plant disease susceptibility on host phenology may have important repercussions for an effective IPM strategy.

Neonectria Canker caused by* Neonectria ditissima *(prev.* N. galligena*)

Dr. Robert Marra's research on Neonectria canker (also previously known as Nectria canker) focuses on the ecology and genetics of this fungal pathogen, *Neonectria ditissima,* with the goal of gaining a fuller understanding of the life history, evolution and population dynamics of the organism and its interactions with its hosts. Knowledge obtained from these studies will be used to develop effective biocontrol strategies. This ascomycete fungus causes highly damaging perennial cankers (often called "target cankers") on a variety of tree species, most frequently on black birch (*Betula lenta*), a hardwood of increasing frequency in northeastern forests, including those in Connecticut.

Dr. Marra's research on *N. ditissima* has focused on the classical and molecular genetics of the pathogen, with the goal of producing a laboratory genetic system and a set of molecular tools that will allow him to study several important, and interrelated, aspects of the natural history and population biology of the pathogen. These include the *N. ditissima* mating system and how it influences mating patterns in natural populations; the ecology of spore dispersal; and the genetic structure of populations. To these ends, Dr. Marra has created a culture collection of isolates from within Connecticut as well as from other parts of eastern North America and Europe; these isolates are essential in developing and testing genetic markers. A thorough understanding of *Neonectria's* population biology also requires an understanding of its mating system. Dr. Marra has succeeded in developing a mating assay that allows him to cross isolates in the laboratory, which will allow him to study segregation and linkage of genetic markers. Cultures obtained from infected bark and wood are being grown to pure culture and analyzed microscopically for key morphological characters (hyphae, microconidia, macroconidia). These bark samples constitute the "maternal" isolates, i.e., parents to the ascospore progeny contained in the fruiting bodies found in nearly all canker samples. The ascospores are used for identification purposes and their DNA will also be analyzed using the aforementioned markers, in order to determine (1) if they are the result of outcrossing or self-fertilization, and (2) if outcrossed, the extent to which they are inbred or outbred. Understanding this aspect of the mating system will also shed light on the fungus' dispersal patterns, and will be critical to development of a biocontrol program.



Representation of AFLP data from 12 *N. ditissima* isolates. The entire AFLP procedure was performed on three replicates of each of the 12 isolates, in order to confirm the reproducibility and robustness of the

assay. Hence, each numbered column consists of three subcolumns of data, one for each of the three replicates. Bands that are uniformly present in all 12 isolates are monomorphic. Bands that are uniformly present in some isolates and uniformly absent in others (indicated by arrows to left of figure) are considered stable polymorphisms that represent informative genetic variation.

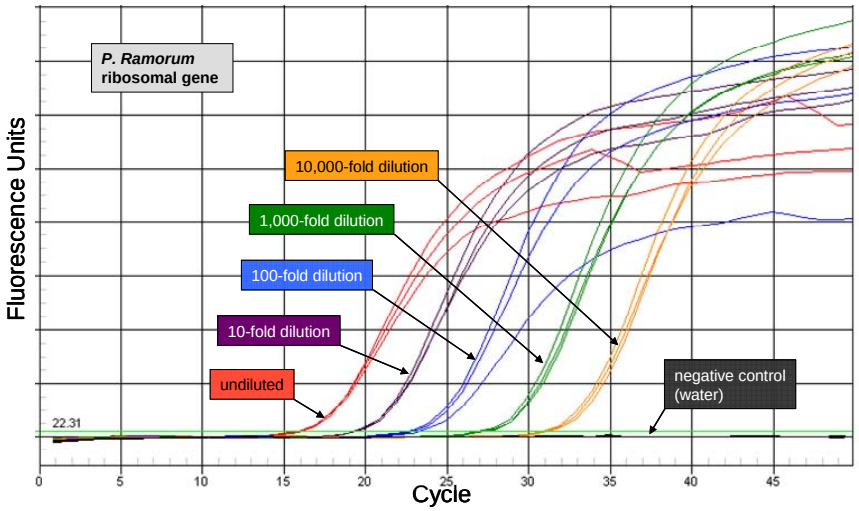
Key to molecular studies is the ability to reliably extract nucleic acids (DNA and RNA) from the fungus, and Dr. Marra, with assistance from **Jason Corwin**, has succeeded in developing assays optimized for high-throughput/low-yield (for population studies) as well as high-quality/high-yield needs (for laboratory studies). Two categories of genetic markers are currently under development. The first type of marker, called Amplified Fragment Length Polymorphism (AFLP), has the advantage of producing a large number of markers with relatively small effort. Two sets of AFLP primers have already identified over 70 markers that are polymorphic (and therefore informative) among geographically disparate strains; a subset of these is polymorphic among Connecticut isolates as well. AFLP markers have the disadvantages of being dominant (polymorphisms scored as presence versus absence) and anonymous (they cannot be studied or treated individually, and determining their location in the genome is not trivial). Nonetheless, they permit testing hypotheses at a gross scale, and help direct research using more labor-intensive markers such as microsatellites, which constitute the second type of marker under development in his lab. Microsatellites are chains of repeating DNA motifs (e.g., acgacgacgacgacg) of varying lengths, and they occur in virtually all eukaryotic organisms. Unlike AFLPs, microsatellites are always codominant – i.e., each allele is uniquely described and identified – and their location in the genome is anchored by unique DNA sequences flanking them. Dr. Marra and Mr. Corwin are currently screening DNA "libraries" for microsatellite motifs, which can then be individually tested against a screening population of isolates disparate geographic origins.

Impact: Over the past sixty or so years, black birch has become an increasingly important component of Connecticut forests, both in terms of the number of trees and the amount of wood. By either metric, it appears that black birch is taking the lead over oaks, maples, beeches, and other species. Cankers caused by *Neonectria* cause major disfigurement, even though trees can persist for decades with several to many such cankers along their stems. These heavily cankered mature trees, which compete for resources (water, light, nutrients), have significantly negative economic and aesthetic impacts. The genetics and epidemiology of the fungus and its role in the forest are poorly understood. Knowledge gained from studies of Neonectria canker will suggest appropriate hypotheses on biocontrol strategies.

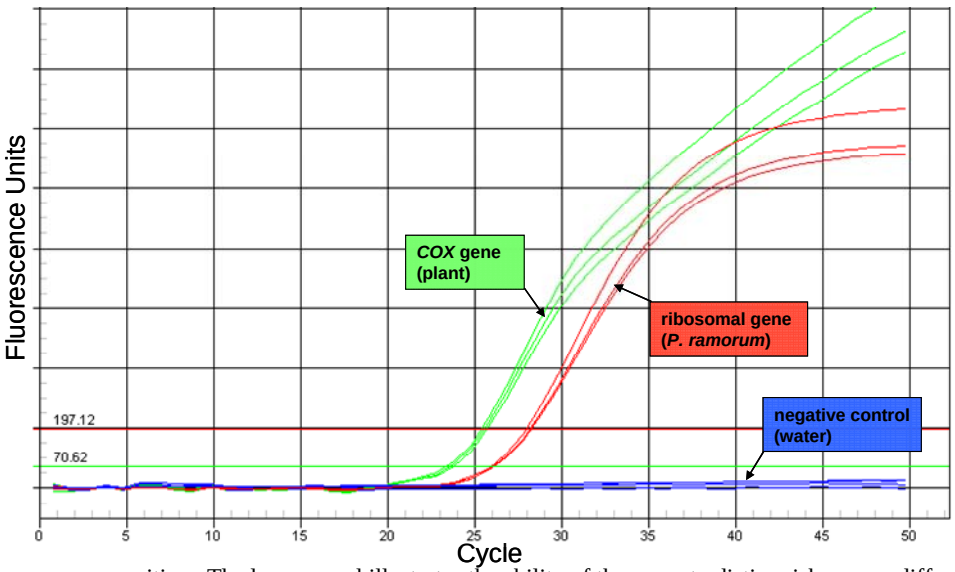
Ramorum Blight/Phytophthora ramorum

Dr. Marra and **Dr. Douglas** have been supervising the implementation of USDA-mandated surveys of Connecticut nurseries for detection of *P. ramorum*. Concern is focused on potential introduction of this exotic pathogen to the state through infected nursery material shipped from California, Oregon, or Washington. Nursery surveys are

conducted in cooperation with **Dr. Victoria Smith** and state inspectors. These assays are being carried out principally by technician **Jason Corwin**. The process begins with a serological test called ELISA (enzyme-linked immunosorbent assay), which detects all *Phytophthora* species. If a sample tests positive by ELISA, DNA is extracted from it and then analyzed for *P. ramorum*–specific nucleotide sequences using nested PCR assays.



The new Molecular Plant Diagnostics Laboratory was given Provisional Approval Status for *P. ramorum* by APHIS-PPQ and in February of 2007, Dr. Marra and Mr. Corwin were certified in the 2007 Proficiency Testing Program for conventional PCR.



Amplification plots of real-time PCR reactions performed on the Bio-Rad iQ5. The vertical axis measures the accumulation of fluorescently labeled PCR products during PCR cycling. The horizontal axis indicates elapsed time, measured in PCR cycles. The upper panel demonstrates the ability of the assay to distinguish plant DNA from *P. ramorum* DNA; this is important because infected leaves will always contain a preponderance of plant DNA relative to pathogen DNA. The negative controls demonstrate that the assay is unlikely to produce a false positive. The lower panel illustrates the ability of the assay to distinguish among different concentrations (in ten-fold dilutions) of *P. ramorum* DNA, each represented by a different color. Each dilution was assayed in triplicate, demonstrating the reproducibility of the assay. Amplification curves for each dilution shift to the right because samples with less starting template require more PCR cycles before their fluorescence accumulation is detected.

***Impact*:** *P. ramorum* is a pathogen of growing concern in Connecticut because of the many species of plants and trees common in Connecticut that are known or suspected hosts. Much of this concern centers on Connecticut's significant nursery industry, which at over $1 billion in annual production ranks Connecticut among the ten largest in the country. Nurseries found to have plants infected with *P. ramorum* are effectively quarantined until rigorously demonstrated to be clear of the pathogen, a process that can take several months. Therefore, Ramorum Blight, independent of its impact on our forests and landscapes, can have a significant impact on the state's economy. Many of the most susceptible hosts—eastern red oak, rhododendron, lilac, mountain laurel, and viburnum, to name a few—are significant parts of the nursery industry as well as Connecticut forests and landscapes. Given that the eastern United States, including Connecticut, is considered at high risk for *P. ramorum*, based on host distribution and climate, concern over the possible release of the pathogen into the environment is warranted. Through the Molecular Plant Diagnostics Laboratory, Dr. Marra's goal is to accelerate and refine our ability to identify *P. ramorum* in infected plants from the nursery, garden center, forest, and landscape, greatly increasing our chances of averting a Ramorum Blight epidemic. Additionally, the molecular diagnostic techniques being used and under development in the MPDL will continue to enhance the disease diagnostics services provided to Connecticut's stakeholders.

Phylogenetics of Stachybotrys spp.

Dr. Marra has been collaborating with **Dr. DeWei Li** in determining the phylogenetic relationships between archived herbaria specimens and present-day *Stachybotrys* molds. Success requires PCR amplification from exceedingly small archival samples, as few as 20-30 conidia. Because of the irreplaceable nature of the herbarium specimens, Drs. Marra and Li are experimenting with "mock-ups" obtained by drying down mycelial samples from present-day cultures, in a manner similar to those found in herbaria, and proceeding with archival-PCR protocols. This technique is still being investigated.

Pestalotiopsis from tree peonies

Dr. Marra has isolated a *Pestalotiopsis* species from a tree peony obtained from a Connecticut grower. The figure below shows the distinctive conidia of this species. Dr. Marra, with assistance from **Dr. Li,** has tentatively identified this fungus as *P. paeoniicola*, a pathogen of tree peony that has never been reported outside of China. The pathogen is published in China as *Pestalotia paeoniicola*, although it has recently been reassigned to the genus *Pestalotiopsis*. Work by Drs. Marra and Li have clarified the taxonomy of this species using morphological characteristics--*Pestalotia* species are typically 6-celled and often with branched, basal appendages, whereas *Pestalotiopsis* species have 5 cells and a whiplike or unbranched basal appendage.

Conidia isolated from cultures of a diseased tree peony, shipped from China to a grower in Connecticut. Note the characteristic 4-septate fusiform shape, with hyaline polar cells and three pigmented central cells, consistent with the published report for the tree peony pathogen *P. paeoniicola*.

Noteworthy disease problems

The genus *Phytophthora* comprises a number of important plant pathogenic species that infect a broad range of hosts. These oomycetes or fungus-like organisms were formerly called "water molds." Among common hosts of concern for Connecticut are bedding plants, container-grown perennials and woody ornamentals, Christmas trees, landscape trees and shrubs, and vegetables. Symptoms associated with *Phytophthora* infections are diverse and include blights, diebacks, root rots, damping off, fruit rots, and cankers. Diagnosis of *Phytophthora* diseases is difficult since it requires a thorough understanding of symptoms, microscopy, selective media to obtain pure cultures, and diagnostic tests. **Dr. Sharon Douglas** has directed the Plant Disease Information Office in honing these skills.

During the past three years, bleeding cankers have been diagnosed on several species of ornamental trees in the landscape, including maple, oak, elm, and beech. Several species of *Phytophthora* were isolated from these cankers, including *P. cactorum*, *P. citrophthora*, and *P. citricola*. Extensive trunk cankers were particularly problematic on mature, specimen European beech without a previous history of problems. Cankers were recognized by bleeding and stained bark, associated with oozing brownish liquid from cracks and wounds in the bark. In some cases, widespread dieback was observed in the tree canopies of infected trees. In addition to the typical bleeding cankers characteristic of this disease, atypical non-bleeding cankers were also found.

During 2006 and 2007, Phytophthora root rot has been a significant problem in landscape shrubs and trees and in Christmas tree plantations. The timing of these new infections appears to be a result of the combination of dry conditions of 2005 followed by the October rains of 2005 that provided optimum conditions for infections, especially on highly susceptible species like Fraser fir and rhododendron. Aboveground symptoms of Phytophthora root rot are not very distinctive, a characteristic typical of most root rot diseases. Symptoms include suppressed growth, poor vigor, yellowed or undersized

needles or leaves, premature needle drop, rolled, off-colored leaves, branch dieback, wilt, and death of plants at any time during the season. Phytophthora root rot is often associated with drainage problems and wet sites. Since this soilborne pathogen produces motile spores that readily move in water, declining plants often follow drainage patterns or are located in low areas that routinely flood. *Phytophthora* can be dormant in soil for many years as mycelial strands or as chlamydospores. When these dormant structures are subjected to warm and saturated soils, even for a few hours, this pathogen can be activated. These were the conditions present during and after the October rains of 2005 when soil temperatures were still greater than 54°F. This was compounded by numerous periods of prolonged rainfall during the 2006 and 2007 growing seasons. Waterlogged soils limited growth of new roots and inhibited the ability of existing roots to absorb water. Several species of *Phytophthora* have been isolated from infected plants. *P. cinnamomi* was most frequently isolated from container-grown plants although *P. cactorum, P. citrophthora,* and *P. citricola* were also found. In addition to Fraser fir, Phytophthora root rot was diagnosed on Canaan and balsam fir and white pine in both Christmas tree plantations and in landscapes. Phytophthora root rot was also prevalent on Ericaceous plants such as rhododendron, mountain laurel, and pieris in container-grown plants in nurseries and in the landscape.

Phytophthora tip blights, caused by *P. cactorum and P. syringae,* have also been identified on woody shrubs. Symptoms appear as brown or blackened terminals, occasionally with rolled leaves. Affected plants include rhododendron, azalea, and mountain laurel.

Phytophthora fruit rot, also called Phytophthora blight, caused by *P. capsici,* was identified on pepper, eggplant, and tomato. *P. infestans,* the causal agent of late blight of potato and tomato, has been noticeably absent for the past few years.

Another species of *Phytophthora, P. ramorum,* is an exotic species that has been of serious concern in Connecticut for the past few years. This is the causal agent of Ramorum Blight (formerly called Sudden Oak Death or SOD). In the course of completing the National Nursery Survey during 2006, one sample tested positive for *P. ramorum.* The plant was rhododendron 'Baden Baden,' which had been shipped into Connecticut from Oregon. To date, there is no evidence of spread of this exotic pathogen into Connecticut forests or landscapes since no natural infections have been found.

This spring, noteworthy and unusually significant winter injury was observed on broadleaved and needled evergreens as well as deciduous trees and shrubs throughout the state. Several factors contributed to the extent of damage this year, including the record warm temperatures of November, December, and January that were followed by extremely cold temperatures in February. A general lack of snow cover and drying winds also contributed to this situation. As a result of the abnormally warm temperatures, plants didn't enter into full winter dormancy. In fact, there were reports of flowers on quince and forsythia, as well as daffodils and snow drops at various locations throughout the state. Particularly visible were rhododendrons of all ages and locations. Damage appeared in early spring and continued into early summer. Affected plants had brown

branches and rolled leaves. Some plants exhibited dieback of shoots whereas others were killed. Other problematic hosts were mountain laurel, boxwood, arborvitae, and juniper.

Disease Survey

Dr. Douglas and **Mary Inman** diagnosed a wide range of plant health problems for homeowners, commercial growers, plant care professionals, and government, state, and cooperative extension personnel during the past year. Fungal and bacterial diseases were prevalent although several viral diseases were also identified on many hosts.

This spring and early summer were similar to last year with cool, wet conditions that prevailed throughout May and into midsummer. These conditions resulted in free moisture on the developing leaves, needles, and shoots and provided favorable conditions for infections by many types of pathogens, including fungi, bacteria, oomycetes (fungus-like organisms), and nematodes.

Herbaceous and Woody Ornamentals: A wide range of diseases was identified on perennials this season. Some hosts and diseases were hosta with hosta X virus and tobacco rattle virus, peony with powdery mildew, anemone with foliar nematodes and bacterial leaf spots, and echinacea, rudbeckia, and chrysanthemum with Septoria leaf spots. Downy mildew of impatiens, a relatively new disease, was reported on several cultivars of impatiens. Xanthomonas leaf spots were diagnosed on the begonia cultivars 'Iron Cross,' 'Escargot,' and 'Bull's Eye.' Diplodia tip blights were identified on a wide variety of conifereous hosts, including pine, Douglas-fir, spruce, and Austrian, white, Scots, and mugo pines. Foliar nematodes were also identified on buddleia. Boxwood exhibited high levels of Volutella blight and significant winter injury.

Tree and small fruit: For the third year in a row, the most important disease of stone fruit was bacterial spot caused by *Xanthomonas arboricola* pv. *pruni*. This disease is usually considered a more "southern" disease but has been unusually widespread and severe in Connecticut since 2005 on many stone fruits, including peach, nectarine, apricot, and plum. Infections occur on twigs, leaves, and fruit and resulted in significant crop loss for several orchardists in 2006. X-disease continues to be a serious disease of many peach blocks. Fire blight, a serious bacterial disease, was identified late in the 2006 season on pears and apples. In 2007, it was diagnosed again in spring and in midseason. Some were in blocks that were infected in 2006, whereas others were in blocks without a previous history of infection. Fabraea leaf spot was also unusually heavy on pears throughout the state. On grapes, powdery mildew, downy mildew, black rot, angular leaf scorch, and anthracnose were problematic on numerous plantings. Phomopsis canker and mummy berry were problematic in some plantings of blueberry.

Symptoms of bacterial spot on apricot fruit first appear as small, depressed, brownish lesions that are often accompanied by pits, cracks, or exuding gum. An entire crop can be lost in one season on highly susceptible varieties.

Vegetables: Noteworthy outbreaks of Septoria leaf spot and blossom-end rot on tomato were reported. Downy mildew, angular leaf spot, plectosporium, and powdery mildew were also diagnosed on many types of cucurbits. Bacterial diseases were prevalent throughout the state in commercial and backyard gardens. Identified by Dr. Douglas and Ms. Inman were bacterial spot and speck on tomatoes, bacterial spot on pepper, soft rot of cucumber, and bacterial leaf spot of turnip.

Mulch: As organic mulches, such as shredded bark and woodchips, become increasingly popular in the landscape, Dr. Douglas and Ms. Inman have seen an increase in problems associated with misuse. Overmulching has contributed to shrub and tree death in a number of landscapes. Applications of mulch that are too thick and too close to the trunks of woody ornamentals initiate a cascade of problems. Of noteworthy concern are "volcano mulches." Key problems with overmulching include poor gas exchange to the root system resulting in asphyxiation of the roots, limited water penetration through the mulch down into the root zone, water held against the trunk for prolonged periods of time that creates optimum conditions for trunk or wood rots, and creation of optimum conditions for meadow voles to feed on the trunk while hidden from their predators. Over time, overly-applied mulches foster development of a substantial portion of the nonwoody root system in the mulch layer, where they are highly vulnerable to wet-dry cycles and desiccation.

Overmulching is often called "volcano mulching" and has become a very serious problem for woody trees and shrubs in the landscape.

Turf: The wet summer of 2006 resulted in many weed and disease problems on residential lawns and golf courses. The key disease problems diagnosed by Dr. Douglas and Ms. Inman were patch diseases (summer patch, Rhizoctonia brown patch, and necrotic ring spot), anthracnose (especially the more atypical basal or crown rot stage), leaf rust, and dollar spot. In spring 2007 and continuing into the summer, red thread remained active because of the cool, wet conditions.

Red thread is readily diagnosed by the "red threads" of fungal mycelium woven through infected turf. This disease was a problem for many home lawns in 2007

Weeds: Predominant weeds in turf were nutsedge, crabgrass, annual bluegrass, ground ivy, henbit, and speedwell. Bentgrass was also frequently identified as a common "grassy" weed in many home lawns. Identification and control of true, running bamboos and Japanese knotweed, plants that often become invasive, continued to be significant problems for many Connecticut landowners. Poison ivy remained a key plant of great public concern, especially after newspaper reports of more aggressive and toxic plants associated with global warming.

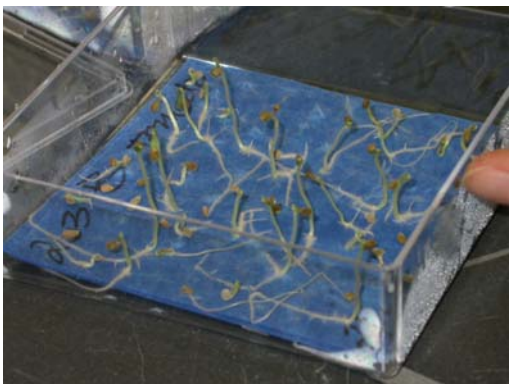
Impact: Information on the diseases that occur on plants in Connecticut landscapes, natural woodlots, and forests each year help to monitor and assess the impact of these problems on the overall health of plants in the state. This information also assists in detecting new diseases or in identifying potentially important emerging diseases on specific plants, which can then be monitored in the years that follow.

SERVICE ACTIVITIES

Members of the Department of Plant Pathology and Ecology are involved in a wide range of service and public outreach activities. Some of these services involve presentations, publications, tours of facilities, and interviews, in addition to being conducted in cooperation with other state agencies.

Seed Testing: In cooperation with the Connecticut Department of Agriculture, Bureau of Regulation and Inspection

Every year, inspectors from the Bureau of Regulation and Inspection of the Connecticut Department of Agriculture collect official samples of vegetable, crop, and lawn seeds for analysis. Samples are submitted to The Connecticut Agricultural Experiment Station since it is the official seed testing laboratory for Connecticut. The Department of Plant Pathology and Ecology performs the germination and purity analyses that are required for compliance with the Connecticut Seed Law Regulations and the Federal Seed Act. In 2007, 324 vegetable and 13 lawn seeds were submitted to **Dr. Douglas** for testing. With assistance from **Ms. Inman,** technician, all seeds are germinated following strict protocols designated by the Association of Official Seed Analysts (AOSA). Seedlings are carefully examined, since they must appear "normal," (i.e., free from decay, have well-developed primary root systems, have well-developed and intact hypocotyls and/or epicotyls, and have healthy cotyledons).



Germinating seeds are counted and examined.

During 2007, eight vegetable seed samples did not meet germination claims. Two samples were retested and failed the second test. Six samples were not retested because of insufficient numbers of seeds. Of the 13 lawn seed samples tested, five met label claims for both purity and germination. Seven samples passed label claims for germination but did not meet claims for purity. One passed label claims for purity but did not meet claims for germination. Another component of the analysis is examination for prohibited noxious weed seeds. None of these samples contained weed contaminants in 2007. A Station bulletin reports the findings of each year's results.

Impact: Germination and purity analyses are performed every year on official samples of vegetable, lawn, and crop seeds by The Connecticut Agricultural Experiment Station, the official seed testing laboratory for the state. The results of these tests provide Connecticut residents with information on the compliance of seeds sold within the state with the Connecticut Seed Law Regulations and the Federal Seed Act.

Samples for Analytical Chemistry and the Connecticut Department of Consumer Protection

During the year, **Dr. Douglas** and **Ms. Inman** examined 44 samples from the Connecticut Department of Consumer Protection at the request of the Department of Analytical Chemistry of the Experiment Station.

Samples for National Nursery Survey of Phytophthora ramorum

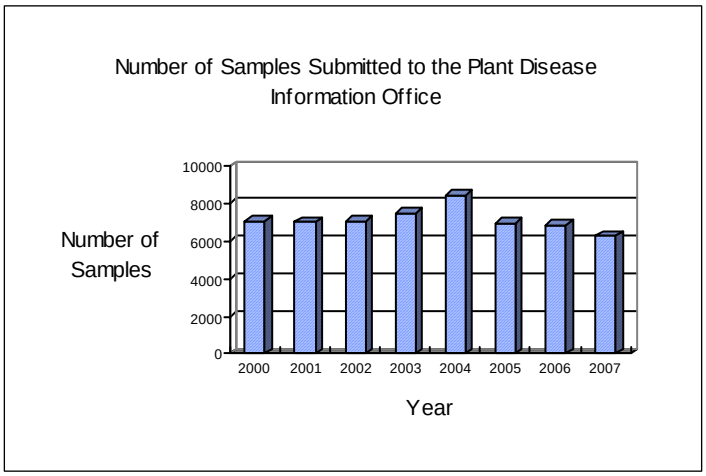
Connecticut participates in a survey of nurseries to assess the presence of the Ramorum Blight (Sudden Oak Death) pathogen, *Phytophthora ramorum*, in our state. The objective is to survey nurseries at risk of harboring or distributing *P. ramorum*-infected plants. **Drs. Douglas** and **Marra** supervise the USDA-mandated assays for testing, which are conducted by **Jason Corwin** (technician). During the past year, **Dr. Victoria Smith** (Deputy State Entomologist) supervised the collection of 274 samples by CAES nursery inspectors and USDA-APHIS PPQ personnel. Samples were then tested for *P. ramorum*. No samples tested positive this year.

Citizen Inquiries

Plant Disease Information Office

Dr. Douglas, assisted by **Ms. Inman**, answered 6,268 inquiries about plant health from Connecticut citizens. Although the majority of inquiries were on ornamentals, trees, and shrubs (66%), other categories, such as food crops (13%) and turfgrasses (5%), were also well represented. A high percentage of inquiries fell into the miscellaneous category (16%), which included plant identification and poison ivy control and identification. Although the majority of inquiries were from Connecticut homeowners (69%), the number of the inquiries from commercial growers and plant care professionals (25%) showed a consistent but increasing trend over the years. Inquiries from cooperative extension, health, news, and agricultural personnel (6%) remained consistent with previous years. A further breakdown of inquiries showed that 49% of the samples came in by phone, 11% came in by mail, 3% came as email (Connecticut only), and 37% were brought in person. Dr. Douglas and Ms. Inman also sent over 840 letters and numerous email messages with attached files of fact sheets. Many citizens opted to download fact sheets posted on the CAES website in lieu of letters since this gave them instant access to the information of concern. Most of the miscellaneous questions were concerned with identification, human toxicity, and control of poison ivy and other poisonous plants, identification of various plants and weeds, mushroom identification for health officials, and information about pesticides and their relationships to health and environmental concerns.

Mary Inman examines a sample with a dissecting microscope for disease diagnosis.



Inquiries to the Plant Disease Information Office have been remarkably consistent over the years.

Additional inquiries

Dr. Anagnostakis answered 2,800 questions and made 39 site visits**. Dr. Elmer** made 9 site visits and answered 18 questions. **Dr. Ferrandino** answered 41 questions from stakeholders.

Impact: Stakeholders in Connecticut have a variety of concerns about plant health, cultural care, disease diagnosis and management, and identification. These issues are addressed by members of the Department of Plant Pathology and Ecology Staff members work closely with professionals and homeowners to develop disease management programs that are compatible with the environment. Accurate diagnosis of plant health problems and subsequent implementation of integrated strategies for disease management suggested by the Plant Disease Information Office are keys to assuring minimal impact of pesticides introduced into the environment and water of Connecticut. Additionally, accurate diagnosis results in saved dollars from reduced pesticide applications (cost of product and cost of application) and from the ability to maintain the value of the crop or commodity by reducing losses due to disease.

General Outreach

Dr. Elmer participated in the BioBlitz event in Middletown, CT, and served as leader of the Plant Pathology team. Over 46 plant pathogens were found.

Awards

Sharon M. Douglas

Connecticut Pomological Society - *Award of Merit 2006*
Connecticut Tree Protective Association - *Award of Merit 2007*

Meetings Sponsored by the Department of Plant Pathology and Ecology

July 20, 2006: Sharon Douglas co-organized a seminar entitled “Getting to the Root of the Matter--Growing Healthy Plants in Container Production” with UCONN, CGGA, and CNLA. The seminar was held in Jones Auditorium. Approximately 50 growers were present.

January 23, 2007. Wade Elmer was the CAES sponsor for a University of Connecticut Cooperative Extension Service outreach meeting for bedding plant growers in Jones Auditorium. Approximately 30 growers were present.

February 1, 2007. Wade Elmer was the CAES sponsor for a University of Connecticut Cooperative Extension Service outreach meeting for bedding plant growers in Vernon, CT. Approximately 35 growers were present.

February 20, 2007. Wade Elmer was the CAES sponsor for a University of Connecticut Cooperative Extension Service outreach meeting for bedding plant growers in Torrington, CT. Approximately 30 growers were present.

April 13, 2007. Wade Elmer sponsored a Lockwood Lecture, Dr. Lawrence Datnoff of The University of Florida, on the role of silicon and plant health. Approximately 50 people attended.

2006-2007. Wade Elmer organized Lunch Club seminars that included 11 presentations by Station staff and outside speakers. Approximately 10-15 people were present at each seminar.

Conference Organizing
Dr. Marra served on the Steering Committee for the Connecticut Conference on Natural Resources during 2006 and 2007. The Conference was held on Friday, 9 March 2007, at The University of Connecticut, Storrs. Over 300 people attended the conference and seven scientists from CAES presented talks and/or posters.

DEPARTMENT OF SOIL AND WATER

Mosquito Trapping and Testing Program. Mosquito surveillance for West Nile virus (WNV) and Eastern Equine Encephalitis (EEE) virus is integral to the public health response to these mosquito-transmitted viruses in Connecticut. The objectives of the surveillance program are to provide: 1) early evidence of local virus activity; 2) information on the abundance, distribution, identity and infection rates of potential mosquito vectors and; 3) information that is used to assess the threat of WNV and EEE to the public and guide the implementation of mosquito control measures. The CAES is responsible for conducting all mosquito trapping and testing activities. The program is conducted by Drs. Theodore Andreadis and Philip Armstrong (assisted by John Shepard, Michael Thomas, and Shannon Finan). Mosquito trapping is conducted at 91 permanent trapping stations that are located in 72 municipalities throughout the state. One-third of the sites are located in southern Fairfield and New Haven Counties, where the highest levels of WNV activity in mosquitoes and humans have been detected in previous years. In 2006, mosquito trapping was conducted from June 6 to October 20. Traps were set and attended by CAES staff every 10 days at each site on a regular rotation. Two trap types were used at all trapping stations – a CO2-baited CDC Light Trap, designed to trap

host-seeking adult female mosquitoes (all species), and a Gravid Mosquito Trap, designed to trap previously blood-fed adult female mosquitoes (principally *Culex* and container breeding *Ochlerotatus* species). Elevated CO^2-baited CDC Light Traps, placed approximately 7 m in the tree canopy, were additionally used at 12 sites in southern Fairfield and New Haven Counties. Mosquitoes were transported alive to the laboratory each morning where they were identified to species. Mosquitoes were grouped (pooled) according to species, collecting site, and date and frozen at –80°C. A maximum of 50 female mosquitoes were included in each pool. Aliquots of each mosquito pool were inoculated into Vero cell cultures for detection of WNV and other mosquito-borne arboviruses of public health importance. Virus isolates from mosquito pools were tested for WNV, EEE, Jamestown Canyon (JC), Cache Valley (CV), Trivittatus (TVT), Highlands J (HJ), and LaCrosse (LAC), and Potosi (POTV) viruses. Isolated viruses were identified by Real Time (TaqMan) polymerase chain reaction (PCR) or standard RT-PCR using virus-specific primers, or by a plaque reduction neutralization (PRNT) test. All of the virus isolation work was conducted in a certified Bio-Safety Level 3 laboratory at the CAES. Weekly test results were reported to the CDC electronically via ArboNet and to the DPH for dissemination to other state agencies, local health departments, the media, and neighboring states.

During 2006, a total of 197,793 mosquitoes (12,661 pools) representing 34 species were trapped and tested. A total of 219 isolations of WNV were made from 7 mosquito species (*Culex pipiens* = 177, *Culex restuans* = 20, *Culex salinarius* = 16, *Aedes vexans* = 2, *Culiseta melanura* = 2, *Coquillettidia perturbans* = 1, and *Ochlerotatus triseriatus* = 1), collected at 25 sites in 22 towns in 5 counties: Fairfield (Bridgeport, Danbury, Darien, Easton, Greenwich, Norwalk, Stamford, Stratford, Trumbull), Hartford (Glastonbury, Hartford, Newington, Southington, West Hartford, Wethersfield), Middlesex (Killingworth, Middlefield), New Haven (East Haven, Milford, New Haven, West Haven), New London (North Stonington). The first positive pool of mosquitoes was collected on June 29, 2006, and the last on October 2, 2006. The frequency and number of virus isolations from mosquitoes were congruent in time and location with each of the 9 human cases that were documented in 2006.

In addition to WNV, six other mosquito-borne viruses were isolated: CV = 4, EEE = 3, HJ = 5, JC = 23, POT = 3, and TVT = 7.

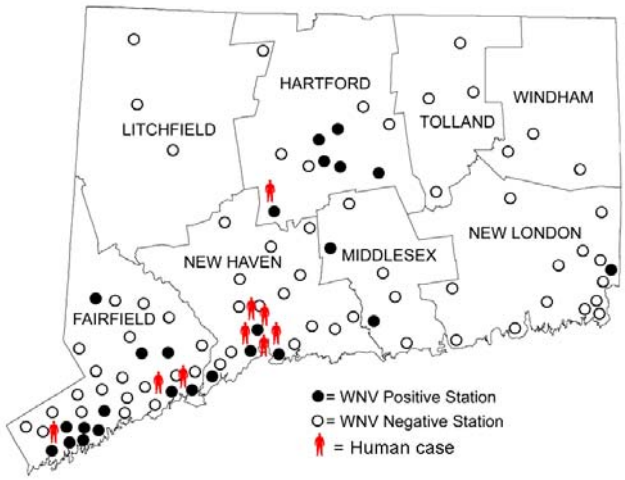
Mosquito species trapped and tested for arboviruses in Connecticut, 2006

Mosquito Species	**# Mosquitoes**	**# Pools**	**Virus**						
			CV	**EEE**	**HJ**	**JC**	**POT**	**TVT**	**WN**
Aedes albopictus	1	1							
Ae. cinereus	12,743	888							
Ae. vexans	23,723	1,303	1			1	2	1	2
An. punctipennis	1,853	466							
An. quadrimaculatus	358	114							
An. walkeri	2,065	185							
Coquillettidia perturbans	17,921	846	1			1			1
Culex pipiens	36,171	1,716							219
Cx. restuans	7,812	850							20
Cx. salinarius	12,440	660							16
Cx. territans	143	49							
Culiseta melanura	6,495	617		3	5				2
Cs. minnesotae	208	17							
Cs. morsitans	67	24							
Ochlerotatus abserratus	2,457	109							
Oc. atropalpus	3	3							
Oc. aurifer	1,056	64							
Oc. canadensis	18,846	803				6			
Oc. cantator	4,546	331				8			
Oc. communis	31	6							
Oc. excrucians	360	66							
Oc. grossbecki	2	2							
Oc. japonicus	883	468							
Oc. provocans	3	1							
Oc. sollicitans	1,760	86	1			3			
Oc. sticticus	8,639	354				1			
Oc. stimulans	1,028	174				1			
Oc. taeniorhynchus	2,713	104				2			
Oc. thibaulti	6,424	196							
Oc. triseriatus	1,989	440					1		1
Oc. trivittatus	11,533	723	1					6	
Orthopodomyia signifera	2	2							
Psorophora ferox	7,450	471							
Uranotaenia sapphirina	6,068	522							
TOTAL	197,793	12,661	**4**	**3**	**5**	**23**	**3**	**7**	**219**

CV = Cache Valley, **EEE** = Eastern Equine Encephalitis, **HJ** = Highlands J, **JC** = Jamestown Canyon, **POT** = Potosi, **TVT** = Trivittatus, **WN** = West Nile

Impact. Mosquitoes were collected at 91 trap sites, located in 72 municipalities, in Connecticut. Following identification, the insects were processed for virus isolations and identified using molecular methods to analyze RNA. During 2006, 197,793 mosquitoes were tested for virus. There were 219 isolations of WNV and 3 isolations of EEE virus. There was one human fatality in the state linked to WNV infection. News releases included information on how residents could protect themselves from mosquito bites, such as the use of repellents. The information contained in the news releases had an immediate impact because many residents polled in two different surveys indicated that they did take the suggested precautions; the affirmative responses of 52 (43%) of 121 persons indicated they had complied with health department requests for increased safety. The long-term benefits include a healthy human population and a well-informed public concerning the potential risks of mosquito bites.

Mosquito trapping stations showing West Nile virus positive sites and human cases in Connecticut, 2006



Mosquito Trapping Research. The effectiveness of CO_2-baited CDC miniature light traps elevated in the tree canopy (~ 7.6m) was compared with light traps placed at ground level (~ 1.5 m) and grass-sod infused gravid traps for collecting *Culex pipiens, Culex restuans,* and *Culex salinarius,* and detecting West Nile virus (WNV) activity in a operational surveillance program that encompassed 12 ecologically diverse sites in Connecticut in 2004 and 2005 by Drs. Andreadis and Armstrong. More than twice as many *Cx. pipiens* were collected on average in light traps suspended in the tree canopy than in either light or gravid traps placed at ground level. This difference was generally restricted to those collection sites where markedly greater numbers of *Cx. pipiens* were collected with all trapping methods but was not associated with site-specific urbanization indices. *Culex restuans* was not preferentially attracted to light traps suspended in the tree canopy. No differences in the overall abundance of this species were recorded with either of the two trapping procedures but both light traps were more effective than the gravid traps. *Culex salinarius* was significantly more attracted to ground-based light traps than traps suspended in the tree canopy, while gravid traps were ineffective at all

sites regardless of the level of urbanization or any other specific land use characteristic. CO_2-baited light traps placed in the tree canopy were generally superior to ground-based light traps for detecting WNV in *Cx. pipiens.* WNV-infected females were collected more regularly and the frequency of infected pools was significantly greater. Two-fold higher minimum field infection rates (MLE = 6.7 vs. 3.0 per 1000 mosquitoes) were also recorded from canopy collections of this species and virus was detected in canopy collected females several weeks before it was detected in collections from light traps at ground level. Based on these results, it is concluded that the use of CO_2-baited light traps placed in the tree canopy for targeted trapping of *Cx. pipiens* and subsequent detection of WNV are likely to yield better overall results than light traps placed at ground level in this region of the northeastern US. The virus isolation data obtained from *Cx. pipiens* collected in gravid traps compared favorably both temporally and spatially with results from canopy trap collections. There were no significant differences in the overall frequency of WNV-infected pools or MLE's for *Cx. pipiens* but fewer total WNV isolations were made from *Cx. pipiens* collected in the gravid traps and virus was detected more infrequently. Results reaffirmed the utility of gravid traps as effective surveillance tools for detection of WNV in *Cx. pipiens* in the northeastern US. However, findings also demonstrated that CO_2-baited light traps placed in the tree canopy provided more consistent results where weekly detection of virus amplification is a critical objective. The comparative effectiveness of ground and canopy-based light traps for detection of WNV-infected *Cx. restuans* and *Cx. salinarius* was inconclusive owing to the limited number of virus isolations that were made from these species during the two years of study. However, WNV virus isolations were made several weeks earlier and more frequently from *Cx. restuans* collected in traps placed in the canopy rather than at ground level in 2004. Results support the view that ground-based light traps are more effective for detection of WNV in *Cx. salinarius*.

Mosquito Light Trap

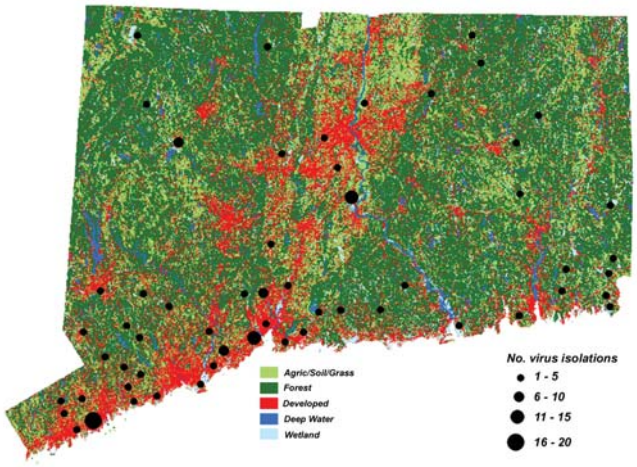
***Culex pipiens* mosquito. The primary vector of West Nile virus in CT**

Mosquito Blood-Feeding Investigations. Knowledge of the blood-feeding behavior of resident mosquito populations is an essential element in assessing their capacity to transmit disease-causing organisms such as West Nile virus (WNV) within a given locality. In 2006, Drs. Goudarz Molaei, Theodore Andreadis and Philip Armstrong undertook a collaborative project with scientists from the Mosquito Control Division, Harris County Public Health and Environmental Services, in Houston, Texas, and the Department of Pathology and Center for Biodefense and Emerging Infectious Diseases, University of Texas Medical Branch, in Galveston, Texas to examine the host-feeding patterns of *Cx. quinquefasciatus* and asses its role in WNV transmission in Harris County, Texas. The vertebrate hosts of 672 blood-engorged *Culex quinquefasciatus* collected throughout Harris County during 2005, were identified by nucleotide sequencing PCR products of the *cytochrome b* gene. Analysis revealed 39.1% had acquired blood from birds, 52.5% from mammals and 8.3% were mixed avian and mammalian blood meals. The most frequent vertebrate hosts were dog (41.0%), mourning dove (18.3%), domestic cat (8.8%), white-winged dove (4.3%), house sparrow (3.2%), house finch (3.0%), gray catbird (3.0%) and American robin (2.5%). Results were interpreted in conjunction with concurrent avian and mosquito WNV surveillance activities leading them to conclude that *Cx. quinquefasciatus* is an opportunistic feeder and principal mosquito vector of WNV in this metropolitan area. However, transmission by other mosquito species or by other modes of infection, such as ingestion, must account for the high WNV infection rates among local blue jays and American crows.

Dr. Goudarz Molaei conducting molecular analysis of mosquito blood meals

Mosquito Arbovirus Studies. Jamestown Canyon virus (JCV) (Bunyaviridae: *Orthobunyavirus*) is a mosquito-borne zoonosis belonging to the California serogroup. It has a wide geographic distribution occurring throughout much of temperate North America, and in humans, causes mild febrile illness with acute central nervous system infection including meningitis and encephalitis, and frequent respiratory system involvement. White-tailed deer, *Odocoileus virginianus*, are the principal amplification hosts, and boreal *Aedes* and *Ochlerotatus* mosquitoes are the primary vectors. A 10-year study was undertaken by Drs. Theodore Andreadis, John Anderson and Philip Armstrong to identify potential mosquito vectors in Connecticut, quantify seasonal prevalence rates of infection and define the geographic distribution of JCV in the state as a function of

land use and white-tailed deer populations which have increased substantially over this period. JCV was isolated from 22 mosquito species. *Ochlerotatus canadensis, Ochlerotatus cantator, Anopheles punctipennis, Coquillettidia perturbans* and *Ochlerotatus abserratus* were incriminated as the most likely vectors based on yearly isolation frequencies and the spatial geographic distribution of infected mosquitoes. JCV was isolated from *Oc. canadensis* more consistently and from a greater range of collection sites than any other species. Frequent virus isolations were also made from *Aedes cinereus, Aedes vexans,* and *Ochlerotatus sticticus* and new North American isolation records were established for *Anopheles walkeri, Culex restuans, Culiseta melanura, Culiseta morsitans, Oc. sticticus, Ochlerotatus taeniorhynchus,* and *Psorophora ferox*. Other species from which JCV was isolated included *Ochlerotatus aurifer, Ochlerotatus communis, Ochlerotatus excrucians, Ochlerotatus provocans, Ochlerotatus sollicitans, Ochlerotatus stimulans, Ochlerotatus triseriatus and Ochlerotatus trivittatus.* JCV is widely distributed throughout Connecticut and consistently circulates in a diverse array of mosquito vectors. Virus activity occurs from June through September and closely parallels mosquito abundance, with peak infection rates extending from mid-June through mid-July. Infection rates in mosquitoes are consistent from year to year and overall virus activity is directly related to local mosquito abundance. Infected mosquitoes are equally distributed throughout the state, irrespective of land use, and infection rates are not directly associated with the abundance of white-tailed deer possibly due to their saturation throughout the region.



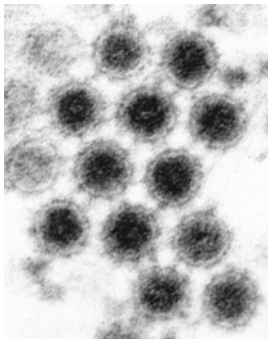
Land use map of Connecticut showing distribution of mosquitoes infected with Jamestown Canyon virus

Jamestown Canyon virus has been implicated in the etiology of meningitis and encephalitis with human cases reported from Ontario, Michigan, Connecticut (CT), and New York. Despite the recognition of symptomatic cases from northeastern US, little is known about the genetic relationships of JCV variants circulating in this region. Accordingly, Drs. Armstrong and Andreadis compared the phylogenetic relationships of 56 JCVs isolated from mosquitoes collected in CT over a 40-year period. They were able to distinguish 3 genetically distinct groups or lineages circulating in CT, based on phylogenetic reconstruction of S segment nucleotide sequences. Viruses representing each lineage infected a diverse group of mosquito species over multiple years of sampling and appeared to be geographically structured along an east-west axis. One of these lineages was detected in CT from 1966-2006 with few mutational changes

accumulating over time. Phylogenetic trees generated from portions of the M and L segments yielded different topologies from S segment sequences as 2 of the 3 clades became consolidated into one clade but otherwise, membership into each clade was consistent between all three genomic segments. Although direct evidence for genetic exchange by reassortment was lacking among co-circulating JCV strains, molecular trees from S, M, and L segments were found to be incongruent suggesting a distinct evolutionary history or process for each genomic segment. Together, these results suggest that JCV variants are stably maintained in CT where they infect a wide diversity of mosquito species.

The phylogenetic relationships of eastern equine encephalomyelitis virus (EEEV) strains are currently being evaluated by Drs. Armstrong, Andreadis, Anderson, and Vossbrinck. Virus isolates obtained from the statewide mosquito trapping program were sequenced and analyzed to discern patterns of evolutionary change and lineage turnover from year-to-year. Preliminary results indicate the following:
1.) EEEV isolates sampled from 1998-2004 could be classified into 7 genetically distinct groups.
2.) Viral isolates segregated into groups according to their year of isolation with the exception of two groups that persisted for more than one transmission season.
3.) Two or more groups arose in 2000, 2001, and 2003, possibly the result of separate introduction events into Connecticut.
4.) The same strains do not reappear in successive years except for one from 2000-2001 and another from 2003-2004. This suggests that local over-wintering occurs in CT but on a limited basis. Most EEEV strains are unique and probably arose from importation events. Long-term persistence of the same viral strain for more than two transmission seasons was not supported by the data.

Impact. These studies on the genetic relationships of mosquito-borne viruses such as EEE and WNV will enable us to track the origin and spread of viral strains involved in disease outbreaks and to identify variants associated with different ecological niches and/or disease outcomes. This information may ultimately be used to improve surveillance and intervention strategies.



Eastern Equine Encephalitis virus

Biological control of the Japanese beetle. Drs. Charles Vossbrinck and Theodore Andreadis completed sequencing the ribosomal DNA from *Ovavesicula popilliae*, a microsporidian parasite of the Japanese Beetle, *Popillia japonica*. Their findings show that this parasite is unrelated to most other microsporidial parasites of insects. *Ovavesicula* represents a very different group Microsporidia and is related to the classical biological control agent of grasshoppers, *Paranosema locustae*. *Ovavesicula* may be a candidate as a biological control agent of the Japanese beetle, which is becoming a serious pest of soybeans.

Statewide surveillance and mapping of Connecticut lakes for aquatic vegetation. Non-native aquatic plants, such as Eurasian milfoil, variable milfoil and cabomba, have become problems in many Connecticut lakes. Information is needed on the distribution of these plants and the conditions that encourage their growth. Beginning in spring 2004 a lake surveillance team (Gregory Bugbee, Dr. Jason White, and Roslyn Selsky) was formed to map the aquatic vegetation in state lakes and compare the results with water chemistry, bathymetery, sediment type, associated plant species and land use in the watershed. Protocols were established using GPS and underwater video technology. An on-line database of the aquatic vegetation maps has been constructed and continually updated. The information will be made available to the scientific community and general public in via a newly designed web page (www.caes.state.ct.us/AquaticPlants/index.htm). One hundred and twenty seven lakes and ponds were surveyed from 2005 – 2007 with 31 being surveyed in 2006. Approximately 100 plant species were observed. Two thirds of the surveyed lakes and ponds contained one or more invasive plants with the following being most prevalent; *Myriophyllum spicatum (43), Potamogeton crispus (42), M. heterophyllum (38), Najas minor (27), Cabomba caroliniana (23),* and *Glossostigma diandrum (5).* Two new invasive plants, *Hydrilla verticillata* and *Egeria densa*, were found in 2006. Data analysis has found the occurrence of invasive aquatic plants have not yet reduced species richness (total number of plant species found in an individual water body). New for 2006 was the development of a bank of frozen plant samples from each lake that can be later used for molecular identification.

Impact. The monitoring and surveillance program has scientifically confirmed anecdotal and historical data; clearly invasive aquatic plant species are both present and problematic in a large number of CT water bodies. The survey data are now being used to direct specific protocols for weed management in lakes.

Greg Bugbee testing new probe

Surveillance and mapping of invasive plants in lakes used for generation of hydroelectric power. The potential for utilizing remote sensing to identify aquatic vegetation. Connecticut has several hydroelectric plants that rely on the release of lake water to power generators. The Federal Energy Regulatory Commission (FERC) has required First LightPower Resources, who owns the hydroelectric plants on Lake Candlewood, Lillinonah and Zoar, to survey and map the lakes for invasive plants on an annual basis. Because the lakes are among the largest in the state, this project could take months to complete. Through a grant from FirstLightPower Resources, CAES IAPP has begun in-lake surveys that will be correlated with images from aircraft or satellite flyovers (remote sensing) to quantify areas of aquatic vegetation. If remote sensing is determined to adequately delineate areas of invasive plants in a manner that meets FERC requirements, hydroelectric companies and others will have a powerful tool for rapid largescale assessment.

Roslyn Selsky conducting aquatic weed survey

Control of Variable Water Milfoil in Bashan Lake. Water milfoil is an invasive aquatic plant that can restrict the recreational use of lakes and eliminate desirable native aquatic plants. Since 1994, the Station has been monitoring the milfoil problem in Bashan Lake, East Haddam. The Connecticut Department of Environmental Protection

(CTDEP), the town of East Haddam and the Bashan Lake Association have awarded grants to the Station to study the use of the herbicide 2,4-D for controlling the milfoil. Greg Bugbee and Jason White have met with the lake association, CTDEP and town officials to educate the public on the project and obtain the necessary permits. In 2000 – 2006, areas of Bashan Lake were treated with 2,4-D (2,4-D ester). Although control was generally very good, re-growth occurred in some areas and new areas of milfoil were found particularly in water depths of 10 – 20 feet deep. Tests in 2001- 2004 have discovered that a late summer application of 2,4-D is likely more effective than the traditional spring treatments and the rate can be reduced from 200 lbs/acre to 75 – 100 lbs/acre with equally good control. Areas treated with 2,4-D usually stay nearly milfoil free for at least two years. Reinfestation is thought to occur either by uncontrolled remnants of previous plants or rooting of plant fragments from untreated portions of the lake. Underwater video equipment linked to a global positioning system (GPS) has allowed CAES to accurately assess where milfoil is occurring and document large areas of milfoil that were previously unknown. This milfoil could be the source of plant fragments. In September 2006 2,4-D was applied to 20 acres of milfoil between Brooks Cove and the boat launch cove. This was an herbicide reduction of 55 percent from 2005 and it is hoped that a gradual reduction in herbicide applications can continue. Nearby groundwater wells are tested and no 2,4-D has been found.

Impact. This research has demonstrated that late season application of the herbicide 2,4-D is likely to be the most effective approach for control of invasive water milfoil in CT lakes. This results in a reduction in the amount of material that is applied as well as the number of treatments thereby increasing efficacy at a considerable economic savings.

Control of cabomba and Eurasian water milfoil in Lake Quonnipaug. Lake Quonnipaug, Guilford CT, has become infested with the non-native aquatic weeds cabomba and Eurasian water milfoil. In 2001 the herbicide Sonar SRP (fluridone, slow release pellets) was applied to two acres of cabomba in the cove near the boat launch with excellent control. This was the first known successful control cabomba with a granular herbicide applied as a spot treatment. In 2002, this area was monitored for regrowth and a total of 122 plants were found and removed by hand pulling. Many of these plants had likely come from fragments floating in from other parts of the lake and taking root. Re-growth of cabomba in the north cove continued through 2005 and cabomba has become a problem again. Re-treatment scheduled for 2005 was delayed by CTDEP until the proximity of an endangered plant called water marigold (*Megalodonta beckii*) could be detailed. Aquatic vegetation was mapped in 2005 and georeferenced locations of water marigold were supplied to CTDEP. This allowed a 30-meter buffer to be set up around the water marigold locations and the North Cove was treated with Sonar SRP in May 2006. By August 2006, the cove was largely clear of cabomba. Water samples were routinely tested for temperature, dissolved oxygen, pH, alkalinity, conductivity, phosphorus, and fluridone.

Control of curly leaf pondweed and Eurasian Water milfoil with preturion diquat application in Crystal Lake, Middletown CT. In response to a request for help by state

representive Gail Hamm on behalf of residents, CAES IAPP (Invasive Aquatic Plant Program) tested the effectiveness of an early spring application of the aquatic herbicide diquat to control curly leaf pondweed in Crystal Lake. This weed has a unique life cycle that causes it to grow rapidly in early spring, produce a reproductive structure called a turion in late spring and then die back by mid summer. The theory behind this experiment was that controlling the pondweed prior to turion production would eliminated the weed the first year and by limiting it's reproductive capacity reduced it the following year. CAES assisted the Town of Middletown in procuring a CTDEP permit to apply the herbicide with the proviso that a state listed species (*Potamogeton vaseyi*) present in two locations was protected with curtain like limnobarriers. CAES located the sites with GPS and, in late April 2007, directed the placment of the limno barrier by a private contractor. After determining existing vegetation on georeferenced transects, CAES applied the diquat in on April 30. At this time, curly leaf pondweed had not yet grown near the surface and was not visible. A survey performed one week later found near 100 percent control of the pondweed and associated Eurasian water milfoil.

Control of Eurasian milfoil, sago pondweed, curly leaf pondweed and coontail with liquid fluridone in Grannis Lake, East Haven CT. The effectiveness of the aquatic herbicides fluridone and Diquat in controlling Eurasian milfoil, sago pondweed, curly leaf pondweed and coontail are being tested in Grannis Lake. Grannis Lake was surveyed for aquatic vegetation prior to the initial treatment and again each spring thereafter. North/South transects were made at 100 feet intervals using GPS. Vegetation samples were obtained every 50 ft., identified, judged for abundance and then brought back to the lab to obtain dry weight. Diquat was applied in May 2005 and fluridone was applied in split applications throughout the summer 2005 to maintain concentrations of 10 –20 ppb. By late May, the diquat had eliminated all Eurasian milfoil, coontail, Sago pondweed, and curly leaf pondweed. The fluridone application prevented any regrowth of these plants for the remainder of 2005. In spring 2006, transects were again surveyed and only curly leaf pondweed and a small amount of Sago pondweed was found. In spring 2007, the transects were again surveyed and dramatic increases in the coverage of curly leaf and sago pondweed were observed, however, no Eurasian water milfoil was found. The Diquat /fluridone treatments were determined to give two years of curly leaf and sago pondweed control with longer term control of Eurasian water milfoil. The next phase of this research entails the introduction of a plant eating fish called grass carp. In 2006, CAES helped the Grannis Lake Owners Association procure a CTDEP permit to allow the introduction and the necessary screen was placed on the lakes outlet stream to prevent the fish from escaping. Water samples are periodically tested for temperature, dissolved oxygen, pH, alkalinity, conductivity, and phosphorus.

Impact. Successful development of an integrated chemical and biological management strategy will increase the tool box of options for lake managers and may result in significantly reduced levels of chemicals being introduced as part of control efforts.


Granis Lake after CAES invasive plant control

Biological control efforts. The first full year of our biological control program has been completed by Dr. Michelle Marko. Initial efforts focused on surveying CT lakes for the Eurasian milfoil weevil (*Euhrychiopsis lecontei*), as well as other relevant invertebrates such as *Acentria ephemerella* (a moth) and *Cricotopus myriophylli* (a midge). There is evidence that these insects have controlled water milfoil in other states and although native to CT, their distribution was unknown. The first year of the surveillance program included 15 lakes, in which we established georeferenced transects through multiple weed beds. Eleven of the lakes were visited once and four were visited on a bi-weekly basis to gain information on insect population dynamics. *A. ephemerella* and *C. myriophylli* were not observed in any of the lakes but *E. lecontei* was found in all 15 water bodies. In all but one instance (Beseck Lake), weevil density was below 1.2 insects/per stem; the literature indicates that significant control of Eurasian watermilfoil by the weevil can occur at densities of 2-4 individuals per stem. Plant samples were collected from all lakes and are being analyzed for parameters known to impact herbivory by *E. lecontei*; namely polyphenols, ash content, and carbon/nitrogen levels. Lastly, 100 gallon tanks containing Eurasian or Northern watermilfoil were established in our greenhouses and populations of *E. lecontei* have been established. These organisms will be used for feeding preference and population studies on the various milfoil species, as well as for mesocosm-based integrated pest management studies this season.

Impact. In a survey of 15 lakes in Connecticut, the Eurasian water milfoil insect was present in all bodies of water. Preliminary evidence indicates that the beetle is having some effect on reducing weed vitality. These findings have immediate impact because there is potential for the successful development of a biological control technology or an integrated chemical/biological strategy to increase management options for lake managers who wish to minimize the use of herbicides. The long-term benefits of this work will be a more balanced approach to removing aquatic weeds from lakes which supply large amounts of potable water, reduced exposure of herbicides to beneficial native plants, and less exposure of pesticide users to herbicides

*Molecular biology studies. E*fforts to create a molecular database of aquatic plant species found in CT waters have continued. Dr. Charles Vossbrinck (assisted by Kirsten Deeds) continues to work on the project and has developed procedures for the isolation of DNA from phylogenetically diverse groups of aquatic plants. Using the isolated DNA, three genes (small ribosomal subunit, internal transcribed spacer ribosomal DNA, intergenic spacer) from each plant have been amplified and sequenced. DNA has been successfully isolated from at least one gene in 56 plant species, and DNA sequences for all 3 genes have been obtained for 36 species. Studies are progressing to create an on-line database on the CAES website (www.ct.gov/caes) and 130 sequences have been submitted to GenBank (http://www.ncbi.nlm.nih.gov/Genbank/index.html). Separately, we are developing several molecular projects to assess the degree of hybridization among different invasive species of concern. In one such collaborative project with Dr. Ryan Thum of the University of Illinois, we have recently observed that four separate lineages of variable milfoil (*Myriophyllum heterophyllum*) exist in CT waters, as compared to New Hampshire where only a single lineage is present. The process of hybridization is of interest phylogenetically but may also have significant implications for control and management efforts.

Impact. The successful implementation of a molecular-based identification system will significantly increase the accuracy of vegetation surveys in CT Lakes and allow for unambiguous identification of exotic species that can not be reliably identified by visual inspection. This information can be used to track the origin and spread of introductions and correctly identify native endangered species.

Kirsten Deeds performing molecular analysis of plants

Outreach effort. Given the magnitude of invasion by non-native aquatic plants, CAES is making significant efforts to engage citizens, lake associations, and other stakeholders as part of this project. CAES scientists have organized several workshops on the identification of invasive aquatic plants; three during the current report period. A number of publications are freely available in hard copy or electronically. Lastly, a web site has been constructed that details all specifics of the CAES Invasive Aquatic Plant Program, including a full description of the research goals and a complete presentation of

the project results (http://www.ct.gov/caes/). Included are all publications in downloadable PDF formats, as well as the digitized interactive maps of all surveyed lakes. CAES scientists also have given presentations to professional organizations such as the Northeast Aquatic Plant Management Society (NEAPMS), the Connecticut Conference on Natural Resources (CCNR), the New England Chapter of the North American Lake Management Society (NEC-NALMS), and the Connecticut Federation of Lakes (CFL).

Phytoremediation of persistent organic pollutants: Studies were conducted by Dr. Jason White in an ongoing investigation of the potential of certain vegetation to remove moderately low levels of persistent organic pollutants from soil and other media. Previous data had indicated that *Cucurbita pepo* (zucchini) cultivars seemed to have remarkable abilities to phytoextract the weathered residues but that significant crop variability may exist down to the species or even subspecies level. Studies were conducted under this line of investigation in the past year. In addition, a new line of study on PCBs and seaweed species was begun.

1.) In field experiments at Lockwood Farm in Hamden, CT, three cultivars of zucchini were grown under different cultivation conditions so as to determine the planting conditions under which maximum contaminant removal would occur. Plants were grown in soils containing 50-300 ng/g weathered DDE. The zucchini plants were grown in replicate mounds of 1, 4, 8 or 16 plants per meter squared. The uptake of DDE into roots and shoots, as well as the overall percentage of contaminant removed, was assessed. Data analysis is ongoing but preliminary evidence suggests that maximum contaminant accumulation occurs at 4-8 plants per mound. *Impact:* Determining the most effective planting strategy for zucchini in contaminated soil will allow the most successful remediation design.

A field study conducted at Lockwood Farm investigating the ability of different cultivars of zucchini to accumulate pesticide residues in soil.

2.) In collaborative experiments with Dr. Donald Cheney of Northeastern University, the ability of two different seaweed species (*Ulva* and *Polysolphinia*) to accumulate a mono-chlorinated, polychlorinated biphenyl (PCB) from seawater was determined. For both species, the loss of PCB from solution was more rapid in live tissue than in killed cultures, indicating that active uptake and not just sorption was occurring.

In addition, PCB levels in the killed tissue remained constant over time, whereas in the live plants, PCB levels dropped. This suggests PCB degradation in the plant after uptake. *Impact:* Developing a seaweed-based system for PCB removal would prove to be an invaluable tool for the on site remediation of contaminated sediments in tidal zones.

3.) In an ongoing collaborative project with Dr. Peter Kulakow of Kansas State University, Dr. Barbara Zeeb of the Royal Military College, and researchers at several universities in Moldova, experiments are currently been planned and implemented on the site of an obsolete pesticide storage facility. These facilities are numerous in many of the former Russian Republics, with highly contaminated soils remaining exposed and untreated. The current experiments are occurring in Moldova and are being funded through a Dutch non-governmental organization. Dr. White is assisting in experimental design and contaminant analysis. *Impact:* Designing and implementing a cost-effective phytoremediation strategy for sites in developing countries could prove to be an extremely useful tool under a range of contamination conditions. Results could be of value in reclaiming polluted land in the United States.

Bioavailability of persistent organic pollutants to earthworms: In collaborative experiments with Elizabeth Guthrie-Nichols of North Carolina State University and Jason Kelsey of Muhlenberg College, Dr. Jason White conducted experiments to determine the impact of multi-species presence on the fate and uptake of weathered DDE and also on the resulting impacts on soil structure. The accumulation of weathered DDE by two worm species (*Eisenia fetida* or *Lumbricus terrestris*) and by two plant species (*Cucurbita pepo* or *Cucurbita maxima*) varied dramatically under single species or multiple species incubation. Preliminary data from elemental analysis of the soils before and after incubation suggest that the shifts in contaminant availability under multi-species conditions correspond with changes in the elemental profile and functional group characteristics of the soil. This suggests that organisms may modify the soil structure in such a way to either promote or decrease contaminant uptake, depending on the characteristics of the particular species present.

Identification of an Artificial Cause of Sorption Hysteresis. Sorption hysteresis in environmental sorbents has important implications for pollutant transport and bioavailability. Dr. Joseph Pignatello examined the reversibility of sorption of benzene, toluene, and nitrobenzene, both singly and in pairs, from water by wood charcoal prepared from maple shavings. A previous study showed that these compounds compete for the same set of adsorption sites on the char. Single-solute sorption was weakly hysteretic at high concentrations. The finding of comparable irreversibility for these compounds was taken as evidence that hysteresis is true and caused by pore inelasticity. Hysteresis in the presence of a competitor was weak at low co-solute concentration but became stronger as the co-solute concentration increased. We attribute the growing hysteresis with co-solute concentration to a thermodynamic 'competitor dilution effect'—a heretofore-unrecognized cause of hysteresis in multi-solute systems when the competing solute is simultaneously diluted with the target solute in the desorption step. It arises because the target solute re-equilibrates from a sorption point where competition is relatively high, to a desorption point where competition is relatively low. Simulations based on Ideal Adsorbed Solution Theory, a thermodynamic competition model, support the hypothesis. The co-solute also causes an increase in the linearity of the target solute isotherm, also attributable to competition thermodynamics. The competitive dilution

effect can play a role in pollutant behavior in real systems if competing substances, natural or anthropogenic, are diluted or degraded making the target less accessible with time.

Attenuation of Surface Activity of Wood Char by Humic and Fulvic Acids. Black carbon (BC), which includes chars and soots, plays a potentially important role in the availability of pollutants in soils and sediments that contain low levels of BC. While raw BC has a high surface activity, and therefore a strong affinity for organic compounds, recent evidence points to the possible attenuation of surface activity by natural substances after a period of exposure. Dr. Joseph Pignatello studied the effects of soil humic (HA) and fulvic (FA) acids on the surface properties and affinity for organic compounds of synthesized wood charcoal. Char powder suspended in a solution of HA or FA was loaded with organic matter via adsorption, evaporation of the water, or co-flocculation with Al^{3+}. These treatments were chosen to simulate initial and more advanced stages of environmental exposure. Co-evaporation dramatically reduced N_2 BET total surface area of the char, but only moderately reduced the CO_2 cumulative surface area up to 1.4 nm. Organic compound adsorption was suppressed in proportion to molecular size: benzene < naphthalene < phenanthrene, and 1,2,4-trichlorobenzene << phenanthrene, for humics in the adsorbed and co-flocculated states, respectively. Humic substances also increased the linearity of the isotherms. The mechanism we propose assumes that humic substances are restricted to the external surface where they act as pore blocking agents or competitive adsorbates, depending on temperature and adsorbate size. Nitrogen is blocked from internal porespace due to stiffness at 77 K of humic strands extending into pore throats, giving artificially low surface area. Together with previous results, this finding indicates that N_2 may not detect BC microporosity in geosorbents. At higher temperatures (CO_2, 273 K; organics, 293 K), humic strands are more flexible, allowing access to interior pores. The counter-intuitive molecular size dependence of adsorption suppression by humics is due a molecular sieving effect in pores in which the adsorption space available to the organic compound is more and more restricted to external sites.

Soil Testing: Testing soil samples for fertility and suggesting methods for growing better plants are a continuing service for citizens of Connecticut. At the laboratory in New Haven, Mr. Bugbee tested 5,327 samples and answered 1,967 inquiries.

Impact. The soil testing services and recommendations made by The Connecticut Agricultural Experiment Station reduce unnecessary fertilizer treatments to lawns and nursery stock throughout the state. This provides direct economic and environmental benefit to the suburban community by reducing nitrogen runoff into soil and water.

VALLEY LABORATORY

RESEARCH ACTIVITIES

Activities on the farm: There were a total of 40 experimental plots during the past year at the Windsor farm. Six Windsor-based scientists had 28 of these plots; seven New Haven-based scientists were using the remaining 12 plots. Valley Laboratory scientists also conducted experiments in many plots off site, such as in growers' fields and State forests. Farm Manager James Preste kept the farm and his equipment ready and in excellent shape. With the help of John Duclos, Jim expertly maintained the many field plots and addressed the specific needs of each scientist. He and his summer assistant did an outstanding job maintaining the extensive ornamental garden in cooperation with the Connecticut Nursery and Landscape Association. Mr. Preste and Dr. LaMondia coordinated the Valley Laboratory effort to comply with EPA Worker Protection Standards for Agricultural Pesticides and organized and conducted training sessions for the staff.

Jim Preste (L), was hired as the new Farm Manager at the Valley Laboratory in 2006 following the retirement of Rich Horvath (R)

Exotic insect pests of hemlock: Hemlock woolly adelgid (HWA), *Adelges tsugae*, a damaging insect pest from Japan, first noted in central Virginia in the early 1950s, is now established from Georgia to Maine. HWA is currently devastating stands of native eastern hemlock, *Tsuga canadensis* and Carolina hemlock, *Tsuga caroliniana* at its southern and mid-range in both forest and urban landscape settings with 18 states reporting HWA infestations. Eastern hemlock, in particular, is a critical species for winter wildlife cover and habitat, watershed protection and temperature stabilization of trout streams. Our native hemlocks are also important shade tolerant conifers for urban and recreational landscaping. Biological control, in a national program supported by the

USDA Forest Service, remains a major tool for long-term forest management of HWA infestations. Connecticut, via the Station, was the first state in the US to study and release the Japanese native predator *Sasajicymnus tsugae* for biological control of HWA studies. Dr. Carole Cheah, funded by the USDA Forest Service, continues to pursue projects to improve the implementation and assessment of biological control of HWA by imported coccinellid predators. Dr. Cheah's research has also documented the contributory impact of winters of varying intensity on subsequent population trends of HWA in Connecticut from 2000-2007. Severe winters (2003 and 2004) affected the survival and distribution of HWA in Connecticut, and this combined with large scale releases of the tiny Japanese ladybeetle, *S.* (formerly *Pseudoscymnus*) *tsugae,* a non-native predator of the adelgid, and adequate precipitation in recent years has resulted in the recovery of many hemlock stands throughout the state. However, with the trend towards global climate change manifest in warming winter temperatures and unpredictable periods of drought, the adelgid will likely remain an important threat to the health of our native hemlocks. This was documented by Dr. Cheah in the most recent winter of 2006-2007, which has been warmer and more unpredictable than usual. Very high survival of the adelgid over the winter over the majority of the state has resulted in the notable resurgence of the adelgid problem, particularly in urban and hemlock stands in 2007. To date, with a survey of seven sites completed, the overall winter mortality of HWA in 2007 in Connecticut was only around 46%, with minimum winter temperatures only dipping slightly below -18 ºC (0 ºF) in the extreme northwestern hills of Litchfield County. The cold spell did not arrive until late January and fall temperatures were unusually mild, allowing the adelgid to develop much faster than usual, especially in southern Connecticut, to reach mature stages found more commonly in the southern Appalachians. This is the lowest HWA winter mortality in Connecticut recorded in 5 years, heralding a return of the adelgid threat to our state's hemlocks.

While the effects of severe winters on adelgid survival have been documented, the role of severe winters as a contributing factor to population survival and predator establishment has not been investigated. *A. tsugae* first invaded the eastern North American landscape in the early 1950s and as such, has had over 60 years to adapt and spread in this country. *Sasajiscymnus tsugae* was the earliest of the exotic predators to be released in the US, starting in 1995 in Connecticut, with the majority of releases implemented in the late 1990s onwards and as such, would be assumed to have had insufficient time to adapt to the climatic variations found in the range of eastern hemlock. Dr. Cheah investigated the population survival and biological characteristics of laboratory reared *S. tsugae* for the winter of 2006-2007 in field cages in hemlock stands in different climatic zones to assess the necessity for re-introductions after harsh winters to augment the establishment of *S. tsugae*. It has been well documented that low temperatures can have extended effects far beyond mortality where development, reproduction and longevity, sterility or poor fecundity in survivors may result. A small winter cage survival study using the predator, *S. tsugae*, was implemented in 3 states: Connecticut, New Jersey and Massachusetts to provide concurrent data on the winter survival abilities of laboratory reared *S. tsugae*. This study was made possible with the cooperation of Mark Mayer and Jenni Desio of the New Jersey Department of Agriculture, Philip Alampi Benefical Insect Laboratory, who provided beetles to

supplement experimental stock from the Valley Laboratory, and help in monitoring cages and sample collections; Charlie Burnham and Michael Geryk of the Massachusetts Department of Conservation and Recreation, who helped in surveying for northern collections of HWA, John Rodgers, who provided the most northerly location for the survival study in Leyden, MA near Greenfield and Jody Bronson of Great Mountain Forest, in Norfolk, CT. In northernmost Massachusetts, average mortality of HWA was only around 60% (3 sites) and in northwestern New Jersey, around 63% (1 site). In this past winter scenario, extreme winter lows below -18 °C (0 °F) were not the critical factor but rather the unusually warm fall and early winter temperatures followed by sudden cold periods in late January, early February and early March accompanied by daily fluctuations of large magnitudes. Although analyses is incomplete at this stage, the effect of such abnormal winter patterns in temperature seems to have affected the survival of caged *S. tsugae*: New Jersey laboratory reared adults experienced an average of 52% mortality in field cages at four sites ranging from northern New Jersey to southern and north central Connecticut but only 4% survival was recorded in the coldest portion of the state, Norfolk, CT, where minimum temperatures were -21°C (-5.8 °F). Survival and fecundity of survivors also appear to have been affected. In a smaller concurrent field cage experiment, it was found that progeny of naturally over-wintered adults from winter field cage studies in 2005-2006 were significantly more cold-hardy in the winter of 2006-2007 than established CT laboratory lines of *S. tsugae*. It appears that improved winter survival of *S. tsugae* can be selected for in laboratory rearing and efforts in 2007 laboratory production have emphasized this. This may have important implications in improving the adaptability of laboratory-reared predators for adelgid biological control. The HWA biological control program should include supplemental introductions where adelgid resurgence is observed due to variable winter mortality of the predator.

Dr. Cheah refined and improved laboratory procedures and reared around 7,000 *S. tsugae* in the Kenneth White Insectary at the Valley Laboratory, and improved numbers reared of more cold hardy lines. In May- June 2007, Dr. Cheah released over 2,000 adults, to augment recent new 2005 and 2006 release sites in the Pachaug State Forest in Voluntown, Mashapaug Lake, Bigelow Hollow State Park in Union, and Cockaponsett State Forest in Haddam, where adelgid populations have increased exponentially in 2007. To date, >176,000 *S. tsugae* have been released at 26 forest and urban sites in Connecticut from 1995-2007. In addition, progeny of a pair of *S. tsugae* collected from a different site in Kobe, Japan were reared by Dr. Cheah and released from quarantine and are now established as a new Valley Laboratory colony line. Over 480 adults of this line have been reared in 2007, for cross breeding with the original colony derived from initial collections from a single tree in Osaka. This will be an objective of paramount importance in 2008 for augmenting and improving the genetic diversity and constitution of the *S. tsugae* colony in the US. With the phasing out of *S. tsugae* production in other insectaries in the US, the Valley Laboratory colony of *S. tsugae* remains the foremost and undiluted line of the original species collected and shipped to the US in 1994 and 1995.

The long-term annual hemlock health assessments of the impact of older predator releases (6-12 year) and weather events in affected hemlock stands have been able to document the recovery and persistence of native hemlock in the majority of older release

sites. These assessments by Dr. Cheah are now in its 13th year of research and data gathered from the 16 established release sites with over 300 trees individually rated showed continued hemlock recovery in most *S. tsugae* sites (81%) with an average foliage transparency (an established method of determining the fullness of the hemlock crown) of 22.7 ± 7.1 with a range of 11.3 – 39% over the 16 sites. No increased hemlock mortality in release sites was recorded in 2006. Soil samples from an additional 21 baseline non-infested and non-release matching hemlock sites established in the 2005-2006 were also completed and analyzed by John Winiarski of the Valley Laboratory.

Impact: Releases of *S. tsugae* into previously heavily infested stands in Connecticut, in conjunction with weather events such as the impact of recent severe winters and wet, cool growing seasons, have continued to preserve and save Connecticut's natural hemlock stands, which were previously in decline. This continued recovery of previously declining hemlock stands in Connecticut is the first to be documented in eastern states that have been infested with HWA since the early 1990s and continued in 2006. Based on this research, *S. tsugae* is being commercially reared and released in multiple states.

The national biological control program using non-native predators of hemlock woolly adelgid is completely dependent on extensive collections of healthy, heavily infested hemlock foliage, primarily collected and shipped from the infested stands in North Carolina. This source of infested foliage is currently threatened by the rapid decline of infested hemlocks on drought stricken national forests of the southern Appalachians. Dr. Cheah, and Dr. Allen Cohen, Insect Diet and Rearing Research, Tucson, Arizona, and Raleigh, North Carolina, have been funded to develop an artificial diet for maintenance and potential rearing of *S. tsugae*. After testing numerous formulations, a diet based on freeze dried chicken eggs developed by Dr. Cohen has shown excellent nutritive potential and this, combined with a diet presentation system composed of non-infested hemlock foliage, has elicited good feeding response by adults. In 2006-2007, *S. tsugae* response to artificial diet was, however, reduced by the inferior quality of freeze dried formulations, which resulted in uneven dispersion of the diet particles in the hydrocolloid matrix. This was identified to be a consequence of equipment malfunction and also attested to the very specialized feeding preferences of this predator. However, cold gelling techniques with sodium alginate appeared to provide an adequate protective skin around the diet which could be contacted without adhesion and penetrated by both larval and adult mouthparts. In addition, laboratory experiments showed the potential of developing artificial presentation systems acceptable to adult S. *tsugae*, which may decrease mold contamination. This project will be the emphasis of research in 2007-2008.

S. tsugae adults feeding on an artificial diet developed by Dr. Allen Cohen

The development of a suitable artificial diet for *S. tsugae* with application to other adelgid predators and a complementary labor-saving delivery system would enable the amplification of mass rearing of predators with significant implications on the economics and efficacy of the national program. An artificial diet will also be critical for long-term maintenance of colonies of predators in a reproductive state in the event of a shortage of HWA.

Dr. Cheah, with the assistance of USDA Forest Service technicians Paul Moore, Gregg Bradford and Trudy Lewis, re-established the original stressed US laboratory colonies and improved mass-rearing techniques for 2 other introduced coccinellid species from southwestern China, *Scymnus sinuanodulus* and *Scymnus ningshanensis*. Successful small-scale mass-rearing methods for *Scymnus* species were developed by Dr. Cheah and her team at the Insect Rearing Facility of the Northeastern Research Station in Hamden, CT, based on the species' preferences for cooler temperatures for oviposition and the methods and technology were transferred to other insectaries in the south for mass rearing of these Chinese species for release evaluations. This portion of Dr. Cheah's research commitment to biological control of HWA using other coccinellid species has now been completed and is no longer funded.

Major accomplishments:

- Continues to be the first to document the recovery of eastern hemlocks statewide, especially in previously heavily damaged, adelgid-infested stands where biological control has been implemented
- Protection of eastern hemlock stands with important ecological consequences for watershed protection and wildlife conservation
- Continued hemlock recovery in state parks, forests and other natural areas for public recreational use and enjoyment
- Identified the importance of understanding the effects of variable winters on non-native predator species and their future establishment for adelgid control
- In collaboration with Dr. Allen Cohen, has identified an artificial diet which has the potential to stabilize adult colonies of *S. tsugae* in the absence of HWA

- Revived *Scymnus* predator colonies for biological control mass rearing transfer to other insectaries for field implementation

Dr. Richard Cowles has continued to improve the understanding of chemical control of hemlock woolly adelgid with systemic insecticides. Starting with work initiated in 1999, he has found that imidacloprid (1) is slow-acting, requiring 2 years to observe the full treatment effect, (2) is much more effective as a soil application, rather than through trunk injection, (3) can provide up to 7 years of suppression of adelgid populations when applied to the soil, and (4) the tree diameter influences the effectiveness of the treatment. The current rapid expansion of hemlock woolly adelgid in the southern Appalachian Mountains threatens to kill hemlocks there quickly, because their warmer winters permit most of the adelgids to survive. Because there is high rainfall in the southern states where hemlocks are found, and hemlocks are a riparian species, there is special concern that insecticide treatments to preserve these trees could threaten nearby aquatic resources. Dr. Cowles has determined that, if properly applied, imidacloprid poses little risk to aquatic life or groundwater. The following factors reduce the risk of adverse movement of imidacloprid: (1) Imidacloprid is bound very tightly by organic matter, therefore, active ingredient placed in the surface organic surface layer found under hemlock trees puts the active ingredient in close contact with the absorptive tree roots but also immobilizes the active ingredient. Replicated soil core studies demonstrated that under severe leaching conditions imidacloprid moves little more than 5 cm in highly organic soil. (2) Lower dosages than those approved on the label can provide significant benefits. As little as 0.25 g active ingredient per inch of trunk diameter (1/3 the lowest labeled dosage) can provide 80% reductions in adelgid populations in 2 years. (3) Controlled release formulations, which meter the active ingredient into surrounding soil very slowly, can provide effective adelgid suppression.

***Impact*:** A slow-release tablet formulation (CoreTect®) tested in Pennsylvania forests by Dr. Cowles is being labeled by Bayer for use in the southern Appalachians where higher per-acre dosages may be needed to protect dense hemlock stands. Economic impacts are difficult to estimate, but the SLN label in 5 states will allow effective treatment of forest trees to maintain important environmental habitats and avoid millions of dollars in removal of hazard trees in recreational areas. In northern forests and landscapes, use of soil-applied imidacloprid has become the standard practice for arborists and homeowners for suppression of adelgid populations.

Weevil management: Black vine weevil and black root rot are vexing soil-dwelling pests of perennial strawberry plantings. Dr. Cowles worked with Dr. LaMondia to identify cultivars of strawberries with resistance or tolerance to these two pests. Strawberry growers can now choose among several pest-tolerant cultivars when replanting their fields. Dr. Cowles has also used the most pest-tolerant cultivars as parents in a breeding program for further improvement. He has developed screening methods to evaluate seedling performance against these pests, resulting in several advanced selections that may be suitable for further propagation and release as new cultivars.

Annual bluegrass weevil is a pest specific to intensively managed golf course turf. Two years ago, golf course superintendents in the greater Hartford area and near Long

Annual bluegrass weevil adult

Island Sound noted that insecticides that they had been using to control annual bluegrass weevils were no longer effective. Dr. Cowles has investigated this problem, and has determined that these weevils have evolved resistance to pyrethroid insecticides. In a team effort including turf entomologists from 5 other states, Dr. Cowles is investigating new chemical control options, insect pathogenic fungi, and insect pathogenic nematodes for managing this pest. Alarmingly, development of resistance to pyrethroids may have predisposed local weevils to be able to survive new classes of insecticides to which they had never been exposed. Dr. Cowles has designed simple test kits that extension entomologists and superintendents can use to determine the pyrethroid resistance status of weevils and whether the cytochrome P450 system is responsible for resistance.

Indoor Fungi Studies: Dr. DeWei Li conducted research on indoor molds of human health concern, fungal succession on building materials, and infiltration of mushroom spores from outdoors into residences.

*Airborne fungi***:** Dr. Li continues to collect air samples both indoors and outdoors in Avon on a weekly basis. This long-term study started in fall 2004 to characterize the airborne fungal concentration and compositions (types of fungi) in Connecticut, to assist establishing the baseline of exposure of residents/occupants to airborne fungi in CT, and to determine seasonal and diurnal patterns of airborne fungi, and at the same time to determine the relationship of airborne indoor fungi with outdoor ones. The samples are under analysis.

***Impact*:** A mid-size suburban school in CT that Dr. Li has worked with has remediated a serious mold problem. Thresholds of fungal exposures are not available in Connecticut and in the United States at present due to lack of long-term research and existence of huge geographic, seasonal, and diurnal variations of airborne fungi. This study will determine the human exposure to airborne fungi in Connecticut and the predominant airborne fungi in the area. Such data are crucial to determine the effects of airborne fungi on public health.

*Fungal succession on building materials***:** Dr. Li continues working on the project of fungal succession on drywall with water damage at different levels. Three batches of samples were collected and analyzed. The samples of the third batch are under analysis.

The data showed fungal population composition is positively related with the level and duration of water damage. With time, the infested areas continue to enlarge significantly, and fungal biodiversity has increased also. Fungal compositions and populations showed a succession pattern. Water-loving fungi, such as *Stachybotrys chartarum* and *Ulocladium* spp., appeared and their colonies increased with time.

***Impact*:** The data indicated that severity of water damage has effects on the fungal composition on the wall units. Fungal species composition evolved on the wall units with the duration of water damage. More water-loving fungi appear under long-term water damage. These data are critical to Indoor Air Quality professionals, certified industrial hygienists, and public health professionals for determining the time line of water damage.

Stachybotrys and *Memnoniella* biosystematics study: Specimens of *Stachybotrys* and *Menoniella* were borrowed on loan from herbaria: in addition to BPI (USA), DAOM (Canada), IMI (UK), and CUP (Cornel University), more type specimens were borrowed from PDD (New Zealand, and Thailand for the study of biosystematics. Six isolates and three isolates of each species were purchased from UAMH (University of Alberta) and ATCC (American Type Culture Collection), respectively. All specimens and isolates were examined morphologically. The taxonomic status of several species is under study and isolates are in the process of DNA extraction for DNA sequencing. DNA sequences will be used for phylogenetic analysis. Examination of the type specimen of *S. cylindrospora* from CUP indicated that *S. cylindrospora* is a synonym of *S. chartarum*. However, the isolate (IMI 85334, OAC 8603, ATCC 18851) published under the name of *S. cylindrospora* represent an undescribed species. A paper to describe the new species *Stachybotrys eucylindrospora* will be published in Mycologia 99 (2) in 2007.

Impact: The newly described species, *S. eucylindrospora*, is new to science. In addition, the study demonstrated the importance of working with type specimens for either classic fungal taxonomy or biosystematics research. Fungal taxonomists will change behavior from the examination of local specimens to examining herbarium specimens, especially type specimens, to correctly evaluate fungal taxa.

Fungal biodiversity study in Connecticut: Dr. De-Wei Li and his colleagues are collecting fungal specimens from various locations in CT. One specimen collected in the woods on CAES Valley Lab property is an undescribed species. It was named as *Goidanichiella cylindrospora* in a paper which will be published in Mycotaxon this summer. Dr. R. Cowles collected a specimen from the elongated hemlock scale, which is another undescribed species. In a collaboration of R. Cowles, C. R. Vossbrinck, and Dr. Li, the fungus was described as a new genus and a new species (*Metarhiziopsis microspora*). This fungus is a pathogen of the elongated hemlock scale. Two more undescribed species are under study. These undescribed species are new to science. Clearly, the bio-resources in CT are not fully studied. Fungal biodiversity is closely related to plants and their habitats. Any change in environment, climate, and vegetation may have significant effects on fungi and lead to disappearance of some fungi. We have good inventories of plants and animals in CT, but not that of fungi. It has been nearly

one century since the last fungal survey in CT, it is the time to conduct a thorough fungal biodiversity study in CT before it is too late for conserving endangered fungal species.

Impact: *Metarhiziopsis microspora* could be a potential new biocontrol agent for the elongated hemlock scale. Other new species, as yet undiscovered, may be present in CT and may have utility as biocontrol agents or be useful for other purposes.

DeWei Li and some of his team members during a field trip in Shennongjia in China, July, 2007

Salt Marsh Decline: Sudden Wetland Dieback (SWD) is a phenomenon that has recently come to the attention of scientists in New England. It consists of the rapid disappearance of salt marsh grass vegetation, resulting in an area of barren mudflat that is often recognizable by various amounts of remnant peat. SWD has occurred from Louisiana to Maine affecting low and high marsh sites. In New England, SWD was first reported along the south shore of Cape Cod in 2002 where approximately 12% of emergent marsh has been converted to mudflats. SWD sites along the tidal rivers draining into Connecticut's Long Island Sound were reported in 2003. Subsequently, dieback sites have been found in all coastal New England states. Drs. LaMondia and Elmer discovered that a plant parasitic root-knot nematode, *Meloidogyne spartinae,* was associated with declining *Spartina* plants in SWD sites, but absent from sites where no SWD occurred. This nematode has been reported from other sites along the Atlantic, but this was the first report from New England. We have initiated a host range test of five common and important marsh grass species and a survey of healthy and SWD sites in CT and MA to determine if it is associated with SWD sites or with other pathogens. Preliminary results indicate that nematode numbers may be highest from *Spartina alterniflora* at the interface of the high and low marshes where *Spartina* may be in decline. These results, in combination with studies of pathogenic *Fusarium* species by Dr. Elmer, may determine whether pathogens play a role in the decline of this important and productive habitat.

Root tip gall caused by the root-knot nematode *Meloidogyne spartinae* (nematode stained red)

Biodiesel: Recently there has been renewed interest in the United States in the development and use of alternative energy sources and fuels. The Connecticut Legislature has requested that The Connecticut Agricultural Experiment Station investigate the production of oilseed crops for biodiesel fuels. To this end, Dr. LaMondia is conducting research to evaluate the growth and yield of alternative fuel oilseed crops either as main season summer crops or as winter cover crops with spring seed harvest. Biodiesel is an alternative, renewable fuel that can be manufactured locally from vegetable oils pressed from oilseed crops or from waste cooking oils. Biodiesel fuels can be used for transportation, as a source of home heating oil, or for electrical generation. Biodiesel can be produced domestically, is biodegradable, and reduces air pollutants. The oilseed crops used for producing biodiesel are typically soybean or canola (also called rapeseed), *Brassica napus*. These oilseed crops are not high value per acre crops and would not compare well with many higher-value crops grown in Connecticut. National average yields and price per acre (as reported by the National Agricultural Statistics Service) for canola and soybean for 2006 result in a value per acre of about $150 for canola and $375 per acre for soybean. Therefore, there would likely need to be other reasons for growing these crops in addition to value as an oilseed feedstock for local biodiesel production. Dr. LaMondia is conducting research on the use of oilseed feedstock plants in integrated pest management programs. For example, canola/rapeseed and pearl millet are oilseed crops that may manage plant parasitic nematodes in soil. *Brassica* plants such as canola or rapeseed produce glucosinolate compounds that hydrolyze to breakdown products such as isothiocyanates, cyanates and nitriles that may be toxic to certain nematode and fungal plant pathogens. Isothiocyanate is one of the active ingredients of the commercial soil fumigant products Vapam and Vorlex. The use of plants or plant products incorporated into soil to deliver effective concentrations of these breakdown products to control pests has been termed biofumigation.

Canola oilseed plots for biodiesel production

Soybeans do not produce pesticidal compounds for biofumigation of pest populations, but they may still have value in an IPM program. Soybeans can be grown as summer rotation crops to rest fields, increase nitrogen fertilizer levels in soil, and manage problem weeds. Soybeans can be grown without added fertilizers, compete well with

weeds and may allow the use of herbicides with different activities. Additionally, the use of Roundup herbicide with Roundup-Ready soybeans can aid in reducing problem weeds that build up over time. The meals remaining after pressing seed of both soybean and canola (rapeseed) have nutrient value that may be utilized as organic fertilizer for plant growth. Approximately one million pounds of organic meal-based fertilizers are currently used in the Connecticut River Valley each year for the production of cigar wrapper tobacco. These meals currently consist primarily of non-local cottonseed meal. Some growers are now producing and using their own soybeans to supplement the cottonseed meals.

During 2006, Dr. LaMondia determined crop yields per acre planted of both soybean and canola/rapeseed in field plots at the Lockwood and Windsor farms. Two canola cultivars, 'Hyola 357 Magnum' and 'Dekalb 38-25', and a Round-up Ready Maturity group I-9 soybean cultivar '6193' were examined in field trials at each location. Seed yields in Windsor were 1356 lb/acre for Hyola 357 Magnum and 1319 lb per acre for Dekalb 38-25. Soybeans were planted in mid-June and harvested in mid October. Harvested yields averaged 61.6 bushels per acre (3695 pounds per acre). The small plot yields compared well with national average yields of 1366 lbs per acre canola and 42.7 bushels per acre for soybean. Canola and soybean oils were used to produce biodiesel by Drs. Walter Krol and MaryJane Incorvia Mattina in the CAES Analytical Chemistry Department. Individual pressings of the different cultivars obtained from the different farms were made to determine the quantity of oil that could be obtained and to note any significant differences in oil quality.

Canola pods with seeds used to produce oils

Our first year data indicated that biodiesel feedstock crop plants produced may be grown successfully in Connecticut as summer rotation crops on rested land. We have also grown rapeseed as an alternative winter cover crop harvested in the spring. We planted on September 21, 2006 and cut plants for harvest on June 20, 2007. The Connecticut Department of Agriculture has indicated that dairy farmers may be interested in canola or rapeseed as over-winter crops, particularly if seed can be harvested early enough to plant summer silage corn crops. These crops may maintain soil conservation practices, increase marketability as a new crop for local biofuel production, protect farm

sustainability by adding integrated pest management tools to manage weeds, pathogens and pests, and additionally reduce soil, groundwater and air pollution by decreasing the use of soil-applied pesticides such as fumigants to control plant pests.

Tobacco pathology: A number of diseases can cause serious losses to the cigar wrapper tobacco types grown in the Connecticut River Valley. The pathogens which cause these diseases are being held in check by multiple approaches, but breeding for plant resistance is being emphasized. The use of plant resistance would have a large impact on disease management, the environment, and human health. The breeding program to develop resistance to tobacco pathogens in Connecticut, including *Fusarium oxysporum* (the fungal pathogen causing Fusarium wilt of broadleaf tobacco); *Globodera tabacum tabacum* (the tobacco cyst nematode); tobacco mosaic virus, and the blue mold pathogen (*Peronospora tabacina*) is continuing for both shade and broadleaf tobacco types. The development and deployment of resistant plants is the most effective, economical and environmentally safe means of managing disease.

Blue mold, caused by *Peronospora tabacina*, has been a recurring problem on tobacco in the Connecticut River Valley from 1997 through 2006, causing losses up to the tens of millions of dollars annually. The development and use of better spray technology, timing of applications, and grower education have greatly reduced blue mold severity in recent years. Tobacco lines with resistance to blue mold were collected from different sources and evaluated for blue mold resistance under field conditions in Windsor. Two shade tobacco lines developed by the USDA in the 1960's, line numbers 509 and 292-393, were promising sources of adapted resistance and have been used as parents in crosses to Connecticut shade tobacco types. A Cuban dark tobacco accession, H2000, was found to be virtually immune to blue mold infection and is also being

Sporulating tobacco blue mold

used as a resistant parent in crosses to Connecticut broadleaf tobacco. Blue mold resistance breeding in shade and broadleaf is being attempted through the selection of resistant inbred lines and the development of male-sterile Connecticut types to allow the production of F1 hybrids between resistant and susceptible shade tobacco and resistant and susceptible broadleaf tobacco. Male sterile lines are being developed to allow

production of F1 hybrid male sterile blue mold resistant seed. Blue mold incidence was compared between susceptible commercial varieties with and without fungicides and resistant lines. Healthy leaves harvested over the 4 weeks of the epidemic were increased by 56 to 100 percent for resistant lines grown without fungicide application compared to susceptible plants with commercial standard fungicides applied. The average numbers of lesions per leaf were reduced by 25 % for resistant lines and lesions averaged 63% smaller and produced 93 % fewer sporangia per cm^3 lesion.

Six advanced F1 male-sterile hybrid broadleaf lines and five advanced F1 male-sterile hybrid shade tobacco lines were distributed to growers for commercial evaluation during the 2006 season. The lines appeared to have potential for commercial production, so seed of the best two lines was increased and tested again on a larger scale in 2007.

Fusarium wilt increased in severity during the 1980's and early 1990's, causing up to 20% crop losses on broadleaf tobacco. The development and release of wilt-resistant broadleaf cultivars has avoided at least $5 million per year in losses due to this disease each year since 1992. Production of CAES wilt-resistant cultivars has reduced spread of the pathogen and kept infested fields in production without soil fumigation. All advanced shade and broadleaf lines under development in the breeding program continue to be screened in the field for high levels of resistance to wilt. In the past year, we have demonstrated that the Fusarium wilt pathogen can be seed-borne and spread through seed propagation, explaining the speed of spread and extent of infested fields.

The tobacco cyst nematode decreases shade tobacco growth and leaf yield directly (losses of up to 15%) and indirectly affects broadleaf tobacco as a component of the Fusarium wilt complex. Single gene resistance to *G. t. tabacum* has been transferred to shade and broadleaf tobaccos using both a pedigree breeding program with repeated backcrossing to Connecticut types as well as a bulk system of modified single seed descent. Approximately 900 progeny of BC9 to BC12 or F1 hybrid crosses were evaluated for nematode resistance and/or horticultural characters in the field and in greenhouse tray evaluations. Leaf quality evaluations were conducted on advanced lines in cooperation with growers from 2004 to 2006 and limited quantities of seed were made available to growers for cooperative field evaluation under commercial conditions. Tobacco cyst nematode shade tobacco lines are being crossed with blue mold-resistant parents to select for resistance to both pathogens. In field evaluations, these resistant lines reduced tobacco cyst nematode populations by 60 to 80%, similar to the effects of soil fumigation with a broad spectrum nematicide. The deployment of TCN-resistant cultivars would reduce human health risks, reduce environmental exposure to large amounts of fumigant nematicides and be more effective than soil fumigation while eliminating fumigation costs of approximately $400 to 500 per acre.

Single dominant gene resistance to tobacco mosaic virus is present in many of these lines. Evaluation and selection for TMV resistance is conducted on all field-grown progeny. From 2002 to 2006, TMV infection resulted in significant commercial losses ($3 million to $5 million) due to green spot symptom development on susceptible shade and broadleaf tobacco leaves. Our research demonstrated the association of green spot

with TMV infection, and determined that plant resistance was the single most important factor for reducing green spot disease. Grower lines were evaluated for resistance to TMV and large amounts of seed of homozygous TMV-resistant shade and broadleaf tobacco produced at the Valley Lab were distributed to growers to reduce losses from virus infection. This seed will avoid large economic losses due to TMV.

Tobacco stalk sprout after cutting with Tobacco mosaic virus

Impact: The development and deployment of pathogen-resistant lines or cultivars will greatly reduce grower dependence on pesticides and allow effective disease management with reduced costs, reduced environmental contamination and reduced grower exposure to health risks. Fusarium wilt resistance has avoided about $75 million in losses over the last 15 years while keeping fields in agriculture and maintaining open space. Blue mold resistance would reduce the number of fungicide applications required at about $50 per acre per application. Tobacco cyst nematode resistance will eliminate the need for soil fumigation at $400 to $500 per acre per year.

Weed research: Dr. Todd Mervosh conducts research on weed management in a variety of crop systems and at non-agricultural sites. In the past year, his projects included weed control experiments in ornamental plants grown in containers, Christmas trees, and pumpkins. These experiments were conducted at the CAES Valley Laboratory in Windsor and/or in growers' fields or nurseries. Dr. John Ahrens is a research partner in some experiments involving ornamentals and Christmas trees. In addition, Dr. Mervosh has projects underway to find effective and environmentally sound methods to control the following non-native invasive plants in natural areas or minimally managed habitats: common reed (phragmites), pale swallowwort, Bishop's goutweed, giant hogweed and mile-a-minute vine.

Mile a minute plots – Dr. Mervosh spraying

Mile a minute vine – a new invasive plant in Western Connecticut

Nursery ornamental weed control: Dr. Mervosh conducted research as part of the USDA's IR-4 Ornamental Horticulture Program to evaluate tolerances of woody ornamental plants to herbicides that are not currently registered for use on these plants. Four ornamental shrub species: arborvitae (*Thuja occidentalis* 'Emerald Green'), rhododendron (*Rhododendron* 'P.J.M.'), spirea (*Spiraea x bumalda* 'Goldflame') and dwarf burning-bush (*Euonymus alatus* 'Compactus') were evaluated for phytotoxicity and weed control efficacy using sulfentrazone 0.2G, sulfentrazone 4F and V-10142 75WG. Halosulfuron 75DF treatments were applied over spirea only because it had been demonstrated previously that the other three ornamentals are not tolerant of halosulfuron.

Evaluations of plant injury or plant vigor were recorded several times:

- Halosulfuron at all doses caused severe stunting and chlorosis of spirea. Some recovery occurred late in the season for spirea treated with the 1X dose of halosulfuron, but plant vigor was still not acceptable.

- The first application of sulfentrazone 0.2G treatments injured spirea only. However, spirea recovered later in the season, and injury was insignificant following the second application.

- The first application of sulfentrazone 4F treatments caused initial injury to spirea, rhododendron and burning-bush. At 9 weeks after the first application, plant vigor was excellent except for spirea treated with sulfentrazone 4F at 2X and 4X doses. Spirea was the only species injured by the second application of sulfentrazone 4F.

- At 4 weeks following the initial V-10142 treatments, severe injury occurred on spirea and burning-bush, and lesser injury on arborvitae and rhododendron. The second application of V-10142 caused additional injury to all plants. By the final evaluation on October 4, spirea had the poorest plant vigor and arborvitae was the most vigorous species.

Of the herbicides tested, the granular (0.2G) and sprayable (4F) formulations of sulfentrazone may have the best potential to gain registrations for preventing weeds in container production of ornamental plants.

Dr. Mervosh also conducted experiments at the Valley Laboratory in 2006 to evaluate several experimental granular formulations of the pre-emergence herbicides flumioxazin (BroadStar) and dimethenamid for weed prevention and safety to several

ornamental species grown in containers. The composition of inert ingredients in the granules controls the release rate of active ingredient (the herbicide) from the granules, thus affecting the herbicidal efficacy of each formulation.

Impact: Flumioxazin has been recently registered for ornamentals, based in part on data from Connecticut.

Weed Management in Pumpkins: Pumpkins are an important crop for many Connecticut growers. The vast majority of pumpkins grown in CT are sold for jack-o'-lanterns and other ornamental purposes. High weed populations are a primary cause of poor pumpkin yields. Thus, adequate weed control is essential for pumpkin production. Herbicide options for pumpkins were evaluated in 2006 in experiments conducted at the CAES Valley Laboratory in Windsor. The best overall weed control was provided by Strategy at the highest dosage and the Curbit + Sandea PRE treatments. However, yellow nutsedge was only controlled in plots in which Sandea was applied. Sandea was effective on yellow nutsedge at all application timings and doses.

Impact: These herbicides had not been widely used in CT. Grower education has resulted in increased use and better weed control. Yield increases of 20% may be expected and would result in potential economic increases of $680 per acre of pumpkins in CT. Over 1500 acres of pumpkins are grown annually in CT.

Dr. Mervosh also conducts a pumpkin variety trial each summer to evaluate up to ten commercial varieties of pumpkins, with fruits that range in size from 1 to 40 pounds, for plant vigor, fruit quality, and pumpkin yield (number and weight of fruits). Data gathered from the pumpkin variety trials and weed control experiments help pumpkin growers optimize production of their crop.

Invasive Plant Management: Common reed or phragmites (*Phragmites australis*) is a very tall perennial grass that spreads aggressively via rhizomes to form large monotypic colonies, primarily in wet soils. Phragmites is a widespread problem in wetlands and marshes because it is highly invasive and displaces many native plants in these habitats. Very few plants can compete with a dense stand of phragmites that can reach heights of 14 feet. Phragmites also alters the hydrology of marshes because of the tremendous amount of water the plants remove from the soil. Phragmites is very difficult to control. Mowing or cutting provides only temporary suppression of this invasive plant. Three herbicides that are approved by EPA for weed control in wetlands and aquatic sites have demonstrated potential for control of phragmites.

Dr. Mervosh is conducting phragmites control research at Ayer's Point Marsh along the Connecticut River in Old Saybrook. This marsh is classified as a tidal marsh, primarily freshwater with some salt water influx with the tides. Herbicide treatments consisted of various dosages and combinations of triclopyr amine (Renovate), glyphosate (AquaPro) and/or imazapyr (Habitat). Plots were evaluated throughout 2005, and final ratings of phragmites vigor, stem density and height were taken in the summer of 2006.

All three herbicides caused significant injury to phragmites within 1 week after treatment application. Glyphosate and imazapyr were much more effective than triclopyr

in preventing or suppressing re-growth of phragmites in 2006. Emergence of some native wetland plants, including cattails (*Typha* sp.), was observed in 2006 in plots where phragmites was controlled.

Impact: Phragmites has invaded several thousand acres of land in Connecticut. Much of these areas are critical wetlands, including inland and tidal marshes. The Department of Environmental Protection manages a large percentage of these marshes. DEP and other property owners are seeking effective and environmentally sound management options for phragmites. As a result of Dr. Mervosh's experiments, DEP contractors have increased the use of Habitat herbicide, increasing weed management at the lowest doses of all options available.

Pale swallowwort (*Cynanchum rossicum*) is an invasive herbaceous perennial vine in the milkweed family. Dr. Mervosh conducted an experiment at Bluff Point Coastal Reserve from 2003 to 2005 to determine the best treatment for control of pale swallowwort along a cobble beach habitat. The most effective treatment was a foliar spray with glyphosate (Rodeo, 2% concentration in water) applied in mid July as pods were approaching full length.

As requested by conservation officials at the Silvio Conte National Fish & Wildlife Refuge (U.S. Fish & Wildlife Service), Dr. Mervosh initiated an experiment in May 2007 to evaluate several treatments for control of pale swallowwort along the slopes of Mt. Tom near Holyoke, MA. The goal is to develop an ecologically sound control strategy to prevent pale swallowwort from overtaking small populations of rare native plants on the slopes.

Bishop's goutweed (*Aegopodium podagraria*) is an invasive perennial groundcover in the parsnip family. Dr. Mervosh is working with Sister Esther Agee at the Abbey of Regina Laudis in Bethlehem, CT to help find a method to control this weed that has invaded much of their extensive property. He established demonstration plots at five locations at the Abbey in which a dense stand of goutweed exists (roadside bank, open meadow, pasture, landscaped area, and a wooded site). Treatments, consisting of glyphosate (Roundup Pro) or triclopyr amine (Garlon 3A) combined with periodic cutting, were applied in September 2006 or in May 2007.

Fall treatments of either herbicide greatly suppressed goutweed growth the following year, although complete control was not attained at any of the locations with one application. Triclopyr, a more selective herbicide than glyphosate, seems to be the better option at sites where substantial populations of grasses and sedges are present.

Dr. Mervosh has been involved for several years in a state-wide program designed to locate and eradicate giant hogweed (*Heracleum mantegazzianum*), a large perennial in the parsnip family. Giant hogweed is also listed as a federal noxious weed because of the human health risk it poses; exposure to its sap can cause severe skin burns or eye damage. He helps identify plants reported to be giant hogweed. Many reported plants are actually cow parsnip, a native plant closely related to giant hogweed, or other species that are similar in appearance.

Impact: Dr. Mervosh provides education about control information for the landowner, or with permission of the property owner, eradicates the giant hogweed plants with directed sprays of triclopyr herbicide, reducing potential health impacts to CT citizens.

Mile-a-minute vine (*Polygonum perfoliatum*) is a fast-growing annual weed with sharp barbs on its stems. It is a recent invader in Connecticut, and so far has only been found in relatively small populations in the southwest corner and along the western edge of the state (near New York border). At the request of Mad Gardeners Inc., a gardening and conservation group based in western CT, Dr. Mervosh initiated an experiment in the spring of 2007 on a New Milford property that has had a sizeable infestation of mile-a-minute since 2005. Treatments included various herbicides (preemergence and/or postemergence), periodic mowing, repeated tillage, a 6" layer of coarse mulch, and landscape fabric. Plots are still under evaluation. Results of this experiment will be used to develop plans for controlling mile-a-minute where it exists, and preventing this invasive plant from spreading.

Christmas Trees: In 2000, Mr. Rathier began a long-term experiment to determine how much nutrition Christmas trees get from the soil they are planted in compared to how much they get from applied fertilizers. Several plantations in Connecticut successfully grow trees with no annual applications of fertilizer though it may take them longer to grow. Forestry research suggests that uptake of fertilizer applied nutrients is slight compared to what trees get from native soil. But the slight extra nutrition that trees obtain from fertilizer nutrients may be enough to maintain quality color and reach salable size a year or more sooner. Therefore, plots have been established at the Valley Laboratory for a ten-year experiment. Uniformly high quality, 4-year-old Fraser fir transplants were planted at ten foot spacing, which will allow for annual root pruning between plots to limit root growth into adjacent plots. One treatment will receive no fertilizer for ten years. Others will receive the following annual treatments that began in 2002: phosphorus and potassium only; nitrogen, phosphorus and potassium (NPK) in the spring; NPK in the fall; NPK in the spring and fall. Results of this experiment could impact the industry by helping growers realize the fertility values of their soils, possible avoiding over fertilization.

In 2000, Mr. Rathier established a Christmas tree transplant survival experiment at the Valley Laboratory. With droughty springs and/or summers occurring in three out of the last five years many Christmas tree growers have experienced substantial transplant losses that may be reflected in a shortage of mature trees in seven or eight years. Since most tree plantations cannot be easily irrigated, bare root transplants are greatly susceptible to drought problems and growers are looking for strategies or products that may assist in survival. Products such as biostimulants, mycorrhizal fungi and planting gels are currently being used to improve transplant survival in the landscape and arborist industries. The volume of roots may also play a role in survival, so the Fraser fir transplants in this experiment were graded into 2 categories – good and poor. Each root grade group was planted with one of the following transplant survival products:

biostimulant; mycorrhizal fungi; planting gel; a combination of all three products; and no treatment.

Enough room was left in this experiment to make a second planting in spring, 2002 in cooperation with Dr. Cowles. Instead of grading by root volumes, however, the trees were graded based on whether or not they had their root systems injured by white grub feeding. The same evaluation criteria will apply to these trees.

The impact of transplant survival experiments should be to help growers optimize survival and avoid costly replanting and losing time in production areas.

Tobacco: One shade tobacco grower in the valley is growing the crop under plasticulture (e.g. plastic film mulch for weed control and leaching management and drip irrigation for water and nutrient management). This method is appropriate for Connecticut tobacco but is complicated by the fact that the quality of our crops is linked to the traditional use of natural sources of nitrogen such as cottonseed meal or castor pomace. Conventional culture allows for the application of these meal types of fertilizers prior to planting and in side-dressings throughout the first 30 days after transplant in the field. Formation of raised beds and installation of the drip irrigation and plastic mulch limit the use of meals to the preplant period only. Determining how much meal to add in advance and its rate of mineralization under the plastic is a significant challenge. Additionally, amounts and timing of supplemental nitrogen applied through the drip irrigation needs to be determined. This study will continue for a few more years to work out all the possible variations of preplant and supplemental nitrogen and their affects on yield and quality. The major impact of this experiment will be to help growers reduce losses of nitrate nitrogen and other solutes to ground water, reduce fertilizer costs and improve the ability to grow a uniform crop.

SERVICE ACTIVITIES

Requests for information: A total of 9,096 inquiries were answered at the Valley Laboratory during the past year. The majority of these queries (70%) were answered by both Mr. Thomas Rathier (5,456), and Mr. John Winiarski (910) in the inquiry office, and by Drs. LaMondia (17%), and Mervosh (5%). About 68% of the requests for information were from the public sector; the remainder was from commercial growers and pest control operators. Inquiries by subject category were as follows: arthropod pests (25%); plant diseases (10%); general horticultural information (29%); soil fertility and water issues (22%); pesticide use (9%); weed control (3%); and mammals, birds and reptiles (2%).

Continuing concern among tobacco growers over tobacco mosaic virus and the blue mold epidemic in the Connecticut River Valley spawned a large number of inquiries to Dr. James LaMondia and Thomas Rathier. Dr. LaMondia initiated and maintained the Connecticut River Valley Blue Mold Web Site to keep tobacco growers current with the progress of the disease in North America, and the potential exposure and management

options in the Valley. He also obtained a Section 18 registration for Quadris fungicide for control of blue mold in shade tobacco.

Inquiry office perspective: Commercial agriculture:

Mr. Rathier made 64 field visits to commercial and municipal fields, nurseries, greenhouses, Christmas tree farms, forests and private landscapes to diagnose complex problems firsthand. Some problems were solved during the visits but many required taking plant and soil samples for laboratory analyses and subsequent reports to the growers. Most of the inquiries from commercial agriculture came during grower visits to the diagnostic lab or during phone calls.

Many diagnoses were centered on plant responses to weather conditions. The 2006 growing season started with frequent cool, very wet conditions in May and June which got most annual crops off to a very slow start. The rest of the summer was quite normal and most crops were successful. The fall was mild and prolonged with mild temperatures extending nearly to the end of January 2007 when severe cold persisted for 3-4 weeks. The remaining months of Spring experienced normal rainfall and temperatures, although drought conditions appeared as June was ending. Many large trees in parks, golf courses and commercial landscapes experienced some recovery from previous years' drought with more robust foliage and branch growth. Anthracnose was observed on many tree species, especially oak, maple, sycamore and birch. Many trees weakened by previous droughts succumbed to vascular wilts such as Verticillium and Dutch elm disease and various borers.

Newly planted and mature Christmas trees, a crop that rarely receives irrigation, benefited from the moist conditions with fewer losses in 2006. White pine weevil, Pales weevil, spruce spider mites and elongate hemlock scale and cryptomeria scale were the insect pests most often reported. Needle diseases (Rhabdocline and Rhizosphaera needlecasts and spruce needle rust were the most reported problems.

Comparatively little winter injury was observed on overwintering woody plants in production with some minor desiccation injuries occurring on broadleaf evergreens and conifers. Woody and herbaceous plants growing in containers outdoors recovered well from problems resulting from irrigation water shortages that limited leaching capabilities resulting in elevated soluble salt levels in potting media. Most plants over wintering in white plastic covered hoophouses or other structures made it through the winter with very few injuries. Freeze and frost injuries and subsequent bacterial or fungal blights and leaf spots resulted in significant losses, especially in lilacs and rhododendrons. Continued cool and wet conditions in Spring 2007 hampered nutrient release from slow release fertilizers resulting in some off color new growth.

Greenhouse growers experienced a bright though difficult to heat late winter season and continued bright conditions resulted in fewer root diseases such as Pythium and foliar diseases, especially Botrytis blight. The marketing season for bedding plants was marred by a few rainy, cold weekends which limited sales.

Golf courses and turf farms experienced reasonably moist conditions with few drought related problems during Summer 2006 but foliar and root diseases were widespread. Forage crops grew slowly during the drought and most growers were hampered by rains with the hay harvest on time in June 2006. Silage crop harvests were reduced in 2006 due to continuous rains.

Small fruit harvests were below average during the 2006 season due to rainy conditions causing significant yield reduction. Spring 2007 saw very little frost damage to strawberries but difficult conditions for harvesting and yields were average. Tree fruits experienced many foliar diseases and reduced pollination as a result of those same conditions.

Vegetable growers experienced good harvests in 2006. Bacterial spot and wilt diseases continued to plague peppers and tomatoes. Growers using plasticulture or row covers had fewer problems despite a colder than normal start. The planting season in 2006 was plagued by prolonged cold, wet soil conditions. Many growers had to replant fields.

Tobacco acreages did well in 2006 despite the cold wet spring, and leaf quality and yields were the best in several years, especially for broadleaf tobacco. Blue mold appeared in only a few isolated spots throughout the Connecticut River Valley with nearly no effect on yields thanks to greater attention to fungicide spray coverage and the widespread use of labeled fungicides such as Forum or Quadris. Ordinary insect problems, such as budworms and aphids were present in many fields. The transplant production season in spring 2006, as was the case in the three previous seasons, was hampered by significant periods of cool, dark conditions, which limited rapid growth in the greenhouse. Also present in spring 2006 was black root rot (*Thielaviopsis basicola*) and root rots caused by *Pythium* and *Rhizoctonia* resulting in substantial losses of transplants. Presently, no fungicide is registered for management of this disease, but growers can successfully use cultural methods to manage the disease.

Commercial and Home Landscapes

As with commercial agriculture, weather conditions throughout the bulk of 2006 started out cool and moist and only moderately hot during the summer and landscape plants were not severely stressed. Mild conditions in early winter and abrupt freezes in late January 2007 resulted in many winter injuries to broadleaf and needled evergreens but fewer than expected actual freeze injuries on mature wood were seen. Arborvitae was the top problem plant with many reasons for browned foliage.

Vascular wilts, most commonly caused by Verticillium, were diagnosed in many different woody plants but most commonly in maples. More than likely the infections were made worse by the droughty conditions of previous seasons. Despite the moist conditions, many trees will continue to fair well into 2007.

Home landscapers reported significant difficulties with transplanted trees and shrubs, due mostly to the lack of proper care. Transplant shock or failure remains the single most important cause of losses in landscapes. In some cases, field dug shrubs and trees did not have enough roots to support the transplant and soil conditions did not allow timely growth of new roots. Container grown plants may have had too many roots that didn't allow the plant to grow new roots until too late. The highly porous conditions of container growing media create conditions where root growth dominates the space within the container and the plants do well while under daily irrigation. But once that root ball is placed in a typical landscape soil, its needs are no longer met. The plant lives on the carbohydrate reserves in the roots and stems and often do not grow new roots. Landscapers and homeowners need to take better care to prevent or limit this condition.

Home landscapers with frequent irrigation habits reported many cases of slime molds growing on mulches, especially wood chips or locally produced bark mulch that contained large amounts of wood. The presence of wood in the mulch allows the mold fungi to grow more rapidly and the moist conditions of regular irrigation created the ideal environment for growth. Artillery fungus that "shoots" spore cases towards light colors such as structures and vehicles, also grow well in these conditions and was widely reported. Also a result of previous dark, moist growing seasons, algae and lichens were reported on a variety of surfaces including trees, paved areas, bare soil, roofs and siding.

Hemlock woolly adelgid has begun to rebound somewhat after three difficult winters in a row. Cool moist conditions in spring 2006 growing season and a moderate winter of 2006-2007 allowed many hemlocks to recover and grow more vigorously. Also plaguing hemlocks and other conifers were elongate hemlock scale and spruce spider mites.

Gypsy moths were not as widespread in most areas around the state, the result of wet conditions in June 2006. Sprays were typically not needed but homeowners and landscapers are being cautioned to scout for egg masses in the coming winter and to be prepared to spray next year. Spring 2006 conditions favored the return of natural controls. Also observed in Spring 2006 were forest tent caterpillars. Orange-striped oakworms were reported in Eastern Connecticut.

Other arthropods of note throughout 2006 were white pine weevil and Pales weevil. Hard pines were once again infested with European sawflies, tip moths and pine shoot moths. Leafhoppers, lace bugs, arborvitae leaf miners were more plentiful and significant defoliation by assorted caterpillars and sawflies was observed on deciduous and evergreen plants.

Also noticed were azalea bark scale, cottony camellia scale, assorted lecanium scales and white prunicola scale. Hibiscus sawfly and lily leaf beetle, both newcomers to Connecticut, continued to establish populations in Connecticut. Viburnum aphids and assorted eriophyid mites were more numerous in spring 2006.

Diseases were more plentiful in 2006-2007, especially foliar disorders such as leaf spots, blights and anthracnose. Anthracnoses have been widespread and especially problematic to sycamores, oaks, maples and birches. Cedar apple rust and other gymnosporangium rusts were quite common on many crabapples, hawthorn and shadbush. Stress related cankers were reported on many trees, especially ornamental cherries, maples and beeches.

Powdery mildew was a problem on many different broadleaf trees and shrubs as well as herbaceous plants. Conifers were plagued by needlecasts, needle rusts, and tip blights.

Home lawns experienced moist conditions throughout summer 2006 that resulted in some diseases but less substantial losses. Disease pressure was much higher on high maintenance lawns, Summer patch, dollar spot, leaf spots, Pythium and red thread were especially prevalent. Large numbers of scarab beetles adults were reported in spring 2007, but white grub injury may be reduced if moist conditions persist in 2007. Chinch bugs were a problem also. Bluegrass billbug outbreaks have been observed on a few occasions and only on sodded areas.

Ground ivy, violets, corn speedwell and yellow nutsedge were the most important weeds in lawns. Poor crabgrass management was a common observation in 2005 due mostly to home landscapers applying pre-emergent controls too early in the season followed by heavy rains and cool conditions. Crabgrass germinated late in most lawns and management compounds were below the seed by then. Moss colonization of poor turf areas received plenty of attention from homeowners, as well.

Management strategies offered for all pests include cultural and sanitary approaches as the primary effort with low impact pesticides as a second effort, and lastly, stronger pesticides when other approaches do not succeed.

Wildlife and Structural Pests

Animal problems were numerous throughout the year with most inquiries concerning squirrels, chipmunks, moles, voles, rabbits, woodchucks, skunks and snakes.

Insects that bother humans were of concern to many homeowners. Mosquito problems were reduced in spring 2007 due to reduced rainfall. Thirty-nine ticks were submitted for identification. Thirty black-legged ticks were forwarded to the lab in New Haven for Lyme disease spirochete analysis. Wasps, especially German yellow jackets and solitary ground bees were bothersome to many.

Ground-dwelling bees have been increasing in numbers in recent years causing problems for home landscapes in the spring but perhaps filling a niche for pollination needs. An interesting observation is an increase in oil or blister beetles in the genus *Meloe* in the fall. Some of these beetles are predaceous on ground bees.

Among arthropods found inside structures, carpenter ants, termites, black and varied carpet beetles, ground beetles, grass carrier wasps, cigarette beetles, larder beetles, acorn weevils, sawtoothed grain beetle, confused flour beetles and spiders received the most attention. Also noted were multicolored Asian lady beetles, squash bugs, western conifer seed bugs, boxelder bugs, clover mites, assorted food infesting beetles, ground beetles, rove beetles, Indian meal moths and centipedes and millipedes. A continued trend of more bed bugs were submitted in greater numbers continued in the past year.

Where management strategies for indoor and other structural pests were necessary, most homeowners chose baiting and/or sanitation rather than pesticide use.

Soil testing: A total of 4,691 soil tests were expertly performed by Mr. John Winiarski during the past year. About 66% were performed for commercial growers, 31% for homeowners, 1.5% for municipalities, and the remainder for Station research. Of the 3,107 commercial samples submitted, 42% were for landscapers; 22% for tobacco growers; 11 % for vegetable growers, 10% for nursery growers; 3% for golf course superintendents; 3% for Christmas tree growers; 1% for greenhouse growers and fruit growers, and the remainder for others.

Gordon S. Taylor Conference Room: Many agricultural organizations used the conference room at the Valley Laboratory regularly for their meetings. During the past year, 31 different groups used the room on 86 occasions. Our most frequent users were the Connecticut Farmland Trust, Farm Wine Council, the CT Wine Association, Connecticut Rhododendron Society, Connecticut Chapter of the National Organic Farmers Association, Connecticut Department of Environmental Protection, Connecticut Farm Fresh, Connecticut Greenhouse Grower's Association, Connecticut Nursery and Landscape Association, and Connecticut Invasive Plants Workgroup. Jane Morrison scheduled the appointments and James Preste arranged the furniture for scheduled meetings and ensured that the room was available after hours.

BULLETINS OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION PUBLISHED DURING 2006-2007

1003 Fungicide Drift from Aerial and Ground Spray Application to Connecticut Shade Tobacco. 12 pages. James A. LaMondia, Francis J. Ferrandino, and MaryJane Incorvia Mattina. (2006)

1004 Seed Germination and Purity Analysis. 17 pages. Sharon M. Douglas and Mary K. Inman. (2006)

1005 Deer Damage Management Options. 13 pages. Scott C. Williams, Jeffrey S. Ward, Uma Ramakrishnan. (2006)

1006 Pesticide Residues in Produce Sold in Connecticut 2005. 12 pages. Walter J. Krol, Terry Arsenault, MaryJane Incorvia Mattina. (2006)

1009 Seed Germination and Purity Analysis 2007. 13 pages. Sharon M. Douglas and Mary K. Inman. (2007)

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