THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

Record of the Year

2008-2009

The Connecticut Agricultural Experiment Station, founded in 1875, was the first state 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, the Valley Laboratory and farm on Cook Hill Road, Windsor 06095, and a research center in Griswold and Voluntown. 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

The main mission of The Connecticut Agricultural Experiment Station (CAES) is research. Work is accomplished by performing experiments in the laboratory and field. In many cases, studies are conducted in growers' fields and forests where plant pest problems occur. During the past year, there have been significant budget cuts due to the severe economic recession and declining state revenue. Nonetheless, there were several agricultural and health problems that still needed special attention. Tire crumbs, used in artificial turf for athletic fields, were found releasing toxic chemicals in laboratory tests. A state study, conducted by CAES, the Department of Environmental Protection, Department of Public Health, and the University of Connecticut (Farmington), was organized to address possible adverse health affects of athletic fields that have tire crumb components. Late blight of tomatoes and potatoes destroyed crops in gardens and commercial fields. Bed bugs have become more numerous in residences and hotels. Ticks continue to be abundant and important transmitters of agents that cause Lyme disease, human babesiosis, and granulocytic anaplasmosis. Finally, mosquitoes have been found carrying the West Nile and Eastern Equine Encephalitis viruses in widely separated areas of the state.

Outreach programs have been expanded to disseminate new scientific findings to the public. Two open house events allowed state residents to meet the scientific staff, see experimental plots and laboratories, hear oral presentations, and to make comment on research programs. The Experiment Station's website has been very effective in facilitating public access to scientific results; there were 1,758,400 page views during the past year. At least 800 talks and interviews were given to civic groups and the media. Articles were published in peer-reviewed scientific journals. Our outreach and research programs will continue to be integrated as we move forward.

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, 2009 were

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

The Board of Control met on August 6, 2008, October 15, 2008, January 20, 2009, and April 15, 2009.

In July 2008, Mr. Leon Zapadka retired from the Board. Mr. Paul Larson replaced him and became Secretary.

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, 2009.

ADMINISTRATION
Dr. Louis A. Magnarelli, Director
Dr. Kirby C. Stafford, III, Vice Director
Michael Last, Chief of Services
Dianne Albertini
Vickie Bomba-Lewandoski
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 A. Berger
Dr. Walter J. Krol
Xiaolin Li
Craig L. Musante
John Ranciato
Dr. Christina S. Robb

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
Ron LaFrazier
Gloria Mach
Miguel Roman
Michael Scott
Nicole Wachter

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
Bonnie L. Hamid
Rose Hiskes
Ira J. Kettle
Morgan F. Lowry
Dr. Chris T. Maier
Michael J. Misencik
Angela B. Penna
Dr. 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
Joan Bravo
Dr. Martin P. N. Gent
Dr. David Hill - Emeritus
Dr. Abigail A. Maynard
Dr. William R. Nail
Michael R. Short
Dr. Paul E. Waggoner, Distinguished Scientist
Dr. Scott C. Williams

GRISWOLD RESEARCH CENTER
Robert Durgy

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
Dr. Botond Balogh
Sandra E. Carney
Dr. Wade H. Elmer
Dr. Francis J. Ferrandino
Mary K. Inman
Dr. Robert E. Marra
Pamela Sletten
Peter W. Thiel

SOIL & WATER
Dr. Theodore G. Andreadis, Department Head
Dr. Phillip M. Armstrong
Martha E. Balfour
Gregory J. Bugbee
Shannon L. Finan
Dr. Shaoming Huang
Dr. Goudarz Molaei
Dr. Joseph J. Pignatello
John J. Shepard
Michael C. Thomas
Dr. Charles R. Vossbrinck
Dr. Jason C. White

VALLEY LABORATORY
Dr. James A. LaMondia, Department Head
Dr. John Ahrens - Emeritus
Jane Canepa-Morrison
Dr. Carole Cheah
Dr. Richard Cowles
Jeffrey M. Fengler
Dr. Dewei Li
Dr. Todd L. Mervosh

James Preste
Thomas M. Rathier
Michelle Salvas
Dr. Hugh Smith
John Winiarski

PLANT SCIENCE DAY 2008

Heavy rain was on tap for Plant Science Day 2008. Just before 9:00am, the rain let up and then finally departed, leaving dark threatening skies for the remainder of the day. The entire staff pitched in to dry things off in time to greet approximately 700 visitors to Lockwood Farm.

The following short talks and demonstrations were well attended throughout the day.

Dr. John F. Anderson and Dr. Francis J. Ferrandino	Bed Bugs in Connecticut
Dr. Sandra L. Anagnostakis	Chestnuts are Coming Back!
Dr. Jeffrey S. Ward	Japanese Barberry Control Alternatives
Dr. Abigail A. Maynard	Growing Your Own Transplants for Your Vegetable Garden
Gregory J. Bugbee	Invasive Plants: Are Our Lakes and :Ponds in Peril
Dr. MaryJane Incorvia Mattina	Communication and Cooperation Through Laboratory Networks: Positive Outcomes of 9/11

Several walking tours of the farm were given during the day.

Dr. Robert E. Marra led two tours of the farm. Despite the wet ground and plots, the tours were popular with visitors who got to view some plots that were more isolated throughout the farm.

Thomas M. Rathier led a tour of participants in the Pesticide Credit Course. Participants were able to discuss experiments and topics with scientists at each of the selected stations on the tour.

Dr. Jeffrey S. Ward gave a half hour guided tour of native shrubs planted at Lockwood Farm. Participants were able to learn about using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

Jeffrey Fengler led a "Butterfly Identification Walk" through the Bird and Butterfly Garden.

Rose Bonito gave a demonstration at the Bird and Butterfly Garden on deadheading in the garden.

The following Barn Exhibits were a popular stop for visitors.

Analysis of Pesticides in Pollen Collected by Honey Bees
Investigators: Dr. Brian D. Eitzer and Dr. Kimberly A. Stoner

Suppressing Soil-borne Nematodes with Biofumigants
Investigator: Dr. Neil A. McHale

Can You Smell Me Now? Chemical Communication in Long-horned Beetles
Investigator: Dr. Claire E. Rutledge, assisted by Mioara Scott

Partial Saturation Ebb and Flow Watering for Potted Plants
Investigators: Dr. Martin P. N. Gent, Dr. Wade H. Elmer, and Dr. R. McAvoy, University of Connecticut. Assisted by: Michael R. Short and A. Causey

Integrated Pest Management for Winegrapes in Connecticut
Investigator: Dr. Francis J. Ferrandino

Connecticut's Invasive Aquatic Plant Problem.
Investigators: Dr. Jason C. White and Mr. Gregory J. Bugbee. Assisted by Roslyn S. Reeps

Visitors made their way through several field plots. The plots are established and maintained by Station scientists with help from Richard Cecarelli, Farm Manager and Rollin Hannan and Michael McHill, and summer farm workers. Together they keep Lockwood Farm in pristine condition and make it an attractive place for visitors to Plant Science Day to spend time and explore.

CHINESE CHESTNUT TREES. Dr. Sandra Anagnostakis, assisted by Pamela Sletten
SHEET COMPOSTING WITH OAK AND MAPLE LEAVES. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
VEGETABLE AMARANTH TRIALS. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
PERSONAL-SIZED WATERMELON VARIETY TRIALS. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
CHINESE CABBAGE TRIALS. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
SWEET POTATO TRIALS. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
CALABAZA SQUASH. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
BUTTERNUTS AND HEARTNUTS. Dr. Sandra Anagnostakis, assisted by Pamela Sletten
USE OF EARTHWORMS TO SUPPRESS FUSARIUM CROWN ROT OF ASPARAGUS. Dr. Wade H. Elmer, assisted by Peter W. Thiel and C. Connelly
USING SOYBEAN MEAL AND CORN GLUTEN ON TURF. Dr. Abigail Maynard and Dr. David Hill, assisted by A. Johnson
INTEGRATED PEST MANAGEMENT OF EURASIAN WATERMILFOIL. Dr. Michele Marko and Dr. Jason White, assisted by A. Russell and R. Rende

CULTIVAR TRIAL OF GREENHOUSE TOMATO GROWN IN COIR DUST. Dr. Martin P. N. Gent, assisted by Michael R. Short

FACTORS AFFECTING COMPOSITION OF HYDROPONIC LETTUCE. Dr. Martin P. N. Gent, assisted by Michael R. Short and A. Causey

EBB AND FLOW WATERING OF POTTED ORNAMENTAL PLANTS. Dr. Martin P. N. Gent, assisted by Michael R. Short and A. Causey

ENVIRONMENTALLY-FRIENDLY CONTROL OF POWDERY MILDEW ON LANDSCAPE PLANTS. Dr. Francis J. Ferrandino

BIOLOGICAL CONTROL OF HEMLOCK WOOLLY ADELGID. Dr. Carole A. Cheah

SUBTLETIES IN CHEMICAL CONTROL OF HEMLOCK WOOLLY ADELGID. Dr. Richard S. Cowles

CHANGING CATERPILLARS AND THEIR NATURAL ENEMIES ON CROPS IN THE CABBAGE FAMILY. Dr. Kimberly A. Stoner, assisted by Tracy Zarrillo, Morgan Lowry, and N. Brettschneider

COMMERCIAL CHESTNUT CULTIVARS. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

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

NEW HYBRID CHESTNUT ORCHARD. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

TABLE GRAPE DEMONSTRATION PLOT. Dr. William R. Nail, assisted by A. Johnson

HYBRID WINEGRAPE CULTIVAR AND PRUNING TRIAL. Dr. William R. Nail, assisted by A. Johnson

COMPARISON OF GRAFT UNION HEIGHT ON CHARDONNAY GRAPEVINES. Dr. William R. Nail, assisted by A. Johnson

BIOCHAR – A BYPRODUCT OF A BIOMASS-TO-FUELS TECHNOLOGY – AS A POSSIBLE SOIL AMENDMENT: CONSIDERATION OF ITS ABILITY TO ADSORB AGRICULTURALLY-IMPORTANT CHEMICALS. Dr. Joseph J. Pignatello, Dr. Jason C. White, and Dr. Wade H. Elmer

QUESTION AND ANSWER TENT. Dr. Botond Balogh, Rose Hiskes, Mary Inman, Thomas Rathier, and Gale Ridge

EXOTIC INSECTS IN CONNECTICUT AND NEARBY STATES. Dr. Chris T. Maier, assisted by Tracy Zarrillo, Morgan F. Lowry, and R. Tellar

DEMONSTRATION TENT

CAES WEATHER STATION

COMPOSTING LEAVES USING THE STATIC PILE METHOD. Dr. Abigail A. Maynard and Dr. David E. Hill, assisted by A. Johnson

NUT ORCHARD. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

VERIZON TELEPHONE TRANSMISSION SILO

MOSQUITO TRAPPING AND TESTING PROGRAM FOR WEST NILE AND EASTERN EQUINE ENCEPHALITIS VIRUSES. Dr. Theodore G. Andreadis and Dr. Philip M. Armstrong, assisted by John J. Shepard, Michael C. Thomas, Shannon L. Finan, M. Bernardo, E.

Calandrella, S. DelRegno, K. Fradette, E. Frank, D. Lazo, W. McConaughy, T. McTague, L. Meany, K. Prapayotin, and M. Torretta

THE FARMER'S COW

EXPERIMENT STATION ASSOCIATES

ARE PLANT PATHOGENS CAUSING SALT MARSH DIEBACK? Dr. Wade H. Elmer and Dr. James A. LaMondia, assisted by Peter W. Thiel and C. Connelly

PHYTOREMEDIATION: USING PLANTS TO CLEAN CONTAMINATED SOIL. Dr. Jason C. White, assisted by Terry Arsenault

HEIRLOOM TOMATO TRIALS. Dr. Abigail A. Maynard and Dr. David E. Hill, assisted by A. Johnson

CONNECTICUT WEEDS AND WILD PLANTS. Dr. Todd L. Mervosh, assisted by D. Reiss and B. Ross

OILSEED CROPS FOR BIODIESEL. Dr. James A. LaMondia, assisted by M. Salvas

SERUM ANTIBODIES TO WEST NILE VIRUS IN NATURALLY EXPOSED AND VACCINATED HORSES. Dr. Louis A. Magnarelli, Dr. S. Bushmich (UConn-Storrs), Dr. John F. Anderson, M. Ledizet (L^2 Diagnostics), and R. Koski (L^2 Diagnostics), assisted by Tia M. Blevins, Bonnie L. Hamid, Dr. N. Bonafe (L^2 Diagnostics), and Dr. L. Kramer (New York State Department of Health)

LYME DISEASE IN TICKS FROM CONNECTICUT CITIZENS. Dr. John F. Anderson and Bonnie Hamid, assisted by Elizabeth E. Alves

THE "DEER TICK" *IXODES SCAPULARIS*. Dr. Kirby C. Stafford, III, assisted by Dr. Anuja Bharadwaj, Heidi R. Stuber, L. Colligan, and K. Dugas

NATURAL PRODUCTS FOR THE CONTROL OF THE TICK "*IXODES SCAPULARIS*". Dr. Anuja Bharadwaj and Dr. Kirby C. Stafford, III, assisted by Heidi R. Stuber, L. Colligan, and K. Dugas

JAPANESE BARBERRY CONTROL. Dr. Jeffrey S. Ward and Dr. Scott C. Williams, assisted by Joseph P. Barsky

INCREASED WHITE-FOOTED MOUSE AND BLACKLEGGED TICK ABUNDANCES IN JAPANESE BARBERRY INFESTATIONS. Dr. Scott C. Williams and Dr. Jeffrey S. Ward

INVASIVE AQUATIC PLANT PROGRAM. Gregory J. Bugbee, Dr. Michelle Marko, Dr. Charles R. Vossbrinck and Dr. Jason C. White, assisted by Roslyn S. Reeps, M. Cavadini, A. Russell, R. Soufrine, and R. Rende

ENVIRONMENTALLY-FRIENDLY CONTROLS FOR POWDERY MILDEW ON CUCURBITS USING FOLIAGE SPRAYS BASED ON COMPOST TEA AND MILK. M. DeBacco, assisted by Dr. Francis J. Ferrandino

USING LEAF COMPOST IN HOME GARDENS. Dr. Abigail A. Maynard and Dr. David E. Hill, assisted by A. Johnson

CONNECTICUT DEPARTMENT OF AGRICULTURE. R. Macsuga

UNIVERSITY OF CONNECTICUT MASTER GARDENERS. J. Hsiang

CONNECTICUT GREEN INDUSTRIES. Robert Heffernan

CONNECTICUT FUND FOR THE ENVIRONMENT. K. Broatch

CONNECTICUT INVASIVE PLANT WORKING GROUP. D. Ellis

CONNECTICUT FARM BUREAU ASSOCIATION. K. Dunai

CONNECTICUT CHAPTER OF THE SOCIETY OF AMERICAN FORESTERS. V. O'Donnell

THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION: DIVISION OF FORESTRY. C. Donnelly and R. Rocks

CONNECTICUT TREE PROTECTIVE ASSOCIATION. R. Smith

CONNECTICUT PROFESSIONAL TIMBER PRODUCERS ASSOCIATION, INC. L. Manville

UNITED STATES DEPARTMENT OF LABOR/OSHA. L. May

USDA, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, PLANT PROTECTION AND QUARANTINE. E. Chamberlain

CONNECTICUT GROWNDSKEEPERS ASSOCIATION. D. Tice

CONNECTICUT FARMLAND TRUST. K. Matus

USDA, NATIONAL AGRICULTURAL STATISTICS SERVICE, NEW ENGLAND FIELD OFFICE. G. Keough

BACKYARD BEEKEEPERS ASSOCIATION. T. Conley

USDA, NATURAL RESOURCES CONSERVATION SERVICE. C. Donzella and K. Kolesinskas

MILFORD TREES, INC. M. Ludwig

THE GIRL SCOUTS. Terry Arsenault

NATIVE WOODY SHRUBS. Dr. Jeffrey S. Ward, assisted by D. Tompkins

BEES, TREES, AND COMMODITIES: THE SURVEY AND INSPECTION TEAM. Dr. Victoria L. Smith, Tia M. Blevins, Jeffrey M. Fengler, Ira J. Kettle, Steven J. Sandrey, and Peter W. Trenchard

CONNECTICUT NURSERYMENS' GARDEN

BIRD AND BUTTERFLY GARDEN. Jane Canepa-Morrison, Jeffrey M. Fengler, and Rose J. Bonito

EASTERN BLUEBIRD NEST BOX TRAIL. Lisa L. Kaczenski

INDUCING FUSARIUM DISEASE RESISTANCE IN GLADIOLUS. Dr. Wade H. Elmer, assisted by Peter W. Thiel and C. Connelly

SOUND SCHOOL AGRICULTURAL SCIENCE PROGRAM. Students from the Sound School

CHESTNUT SPECIES AND HYBRIDS. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

DENSE PLANTING OF AMERICAN CHESTNUTS. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

DWARF HYBRID CHESTNUT TREES. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

ROCKY HILL AMERICAN CHESTNUT TREES. Dr. Sandra L. Anagnostakis, assisted by Pamela Sletten

PINOT GRIS CULTURAL TRIALS. Dr. William R. Nail, assisted by A. Jonhnson

HYBRID AND VINIFERA WINEGRAPE CULTUVAR TRIAL. Dr. William R. Nail, assisted by A. Johnson

BEACH PLUM TRIALS. Dr. Abigail A. Maynard and Dr. David E. Hill, assisted by A. Johnson

JAPANESE PLUM VARIETY TRIALS. Dr. Abigail A. Maynard and Dr. David E. Hill, assisted by A. Johnson

WHITE BIRCH RESEARCH ORCHARD. Dr. Claire E. Rutledge, assisted by M. Scott

Tents were set up and other physical arrangements were made by Bancroft Nicholson, Head of the Maintenance Department and his staff Ron LaFrazier, Miguel Roman, Michael Scott, and Nicole Wachter, the Farm Staff – Richard Cecarelli, Farm Manager, Rollin Hannan and Michael McHill; Tia Blevins and Vickie Bomba-Lewandoski of Station Staff, and Roberta M.-Ottenbreit of Administration.

At 11:00AM Dr. Louis A. Magnarelli, Director, welcomed visitors to Plant Science Day.

The Century Farm Award was presented to Buell's Orchard of Eastford, Connecticut.

Buell's Orchard, located in Eastford, Connecticut, promotes itself as "The Best Kept Secret in the Quiet Corner of Connecticut". The farm has been in the Buell family since Henry Buell purchased the land in 1889. He began with sheep and dairy cows and enhanced farm income by making charcoal to sell to the factories in Southbridge, MA. Peach and apple trees were added to diversify farm operations.

During the 1930's, the Buell family also operated a sawmill on 600 acres and helped clean up woodlands after the 1938 hurricane. Like most farms in New England, there was an ability to adapt to changing conditions. The family also was a founding member in establishing Quinebaug Valley Cold Storage, a cooperative apple storage facility that still operates in Putnam, Connecticut.

In more recent years, a cider mill and caramel apple business were added. This action is yet another example of how the family utilized innovative ideas to keep the farm profitable.

Today, under the ownership of Jeff and Jonathan Sandness, great grandsons of Henry Buell, the farm includes over 110 acres of apples, strawberries, blueberries, peaches, pears, and pumpkins. Customers enjoy roaming through the pick your own operations and selecting many delicious fruits to bring home. The Farm Stand offers fresh apple cider, caramel apples, preserves, pies, pumpkins, and fresh fruits and vegetables.

Following the Century Farm Award, the Samuel W. Johnson Lecture was delivered by Steve Grant, Staff Writer for The Hartford Courant. He gave the talk "Are We Making Progress? A journalist's perspective on more than three decades of environmental and agricultural change in Connecticut"

After Mr. Grant's talk, Dr. Louis A. Magnarelli introduced Pam Weil, President of the Experiment Station Associates, who explained who the Associates are and encouraged members of the audience to join.

The combined efforts of the entire staff – Professional, Technical, Clerical, Administrative, Maintenance, and Farm staff – all made Plant Science Day 2008 the successful day it was.

EVENTS HELD AT THE STATION

GETTING STARTED IN ORGANIC FARMING CONFERENCE

On January 17, 2009, Dr. Kimberly Stoner co-hosted a conference for beginning farmers or persons who wanted to transition to organic practices. 45 people attended. In addition to co-organizing the conference with Bill Duesing, Executive Director of the Northeast Organic Farming Association of Connecticut, Dr. Stoner presented a talk on "Organic Methods of Pest Management". The keynote speakers were John and Lynn Holbrook of Holbrook Farm in Bethel with the talk "Surprise! You Can Make a Living Doing This!" James Roby of Roby's Organic Farm in Berlin gave a talk on setting up a business and marketing strategies. Paul Bucciaglia of Fort Hill Farm in New Milford spoke on "Soil Fertility and Crop Rotation". Dawn Pettinelli of the University of Connecticut spoke on "Making and Using Compost", and Don Franczyk of Baystate Organic Certifiers spoke on "Organic Certification".

ANALYTICAL CHEMISTRY HOSTS TOUR FOR LEGISLATORS AND PUBLIC

On January 29, 2009 the Department of Analytical Chemistry opened its laboratories to legislators and the public to view the work and research taking place there. Two state representatives attended, as did personnel from the USFDA, FBI, and Consumer Reports. Media coverage in print and TV was comprehensive. All department staff participated in this event.

CONNECTICUT BED BUG FORUM HELD AT STATION

On March 17, 2009, 180 delegates (a capacity crowd) from local health departments, housing authorities, pest control companies, researchers, educators, manufacturers, and distributors met to discuss the coordinated management of bed bugs in the State of Connecticut. Dr. Gale Ridge organized the event in cooperation with Pamela Kilby-Fox of the Connecticut Department of Environmental Protection, Judith R. Dicine, of the Connecticut Division of Criminal Justice, Tim Callahan of the Norwalk Health Department and Mike Lipsett of Connecticut Pest Control. Dr. Kirby C. Stafford, III welcomed the group and spoke about the re-emergence of bed bugs as a major pest problem in Connecticut. Dr. Ridge talked about bed bug biology, history, and factors associated with their recent resurgence. Dr. John F. Anderson talked about research that he is conducting on bed bugs as well as other research and developments on bed bug control. A demonstration of the use of trained dogs for the detection of small bed bug populations was provided by Mr. Charlie Mastroberti and his bed bug sniffing dog, Ellie. Other speakers were Michael Siwek, Executive Director of West Haven Housing Authority who talked about the housing authority's experiences with bed bug issues and the difficulty in dealing with people's anxieties over the pests, and Attorney Judith R. Dicine from the Connecticut Division of Criminal Justice, who led the audience through the legal issues of bed bug management. After the presentations, the speakers formed a panel and discussed with the audience ways to help provide a coordinated management effort of bed bug control between different local and state agencies and pest control professionals in Connecticut.

STATION HOSTS DELEGATION FROM HUBEI PROVINCIAL ACADEMY OF FORESTRY, CHINA

On May 26, 2009, a Chinese delegation visited the Station. The three person delegation was hosted by Dr. Jason White and Dr. DeWei Li, and they toured their laboratories during the visit. After spending the morning and lunchtime in New Haven, the delegation left for a tour of the Valley Laboratory.

EVENTS HELD AT THE VALLEY LABORATORY

NURSERY AND LANDSCAPE RESEARCH TOUR

Over 60 nursery and landscape professionals attended the Valley Laboratory's annual Nursery and Landscape Research Tour on September 16, 2008. Attendees were welcomed by Dr James LaMondia and then toured research plots for the following presentations: Beach plums for Connecticut, Dr. Abigail Maynard; Grape disease vineyard, Dr. Frank Ferrandino; Cover crops for disease/nematode management, Dr. James LaMondia; Conifer nutrition needs, Tom Rathier; Variety trial vineyard, Dr. William Nail; Systemic insecticide update, Dr. Richard Cowles; Japanese plums for Connecticut, Dr. Abigail Maynard; Vineyard disease management strategies, Dr. Frank Ferrandino; Exotic insect display, Rose Hiskes; Weed management for field grown woody plants, Dr. John Ahrens and Dr. Todd Mervosh; Container media/water relationships, Tom Rathier;Weed management in container grown plants, Dr. Hugh Smith, Dr. Todd Mervosh and Dr. John Ahrens; CAES/CNLA education garden, Rose Hiskes. The tour was concluded with the following talks:*Biofumigation and biodiesels*, Dr. James LaMondia; *Management of plant disease emergencies*, Dr. Sharon Douglas; *Arthropods and pesticides update*, Rose Hiskes; *Disease and cultural problem update*, Dr. Botond Balogh. James Preste, Jane Morrison and John Winiarski provided help with preparations and during the meeting.

ANNUAL TWILIGHT MEETING FOR CHRISTMAS TREE GROWERS

On July 10, 2008, over 50 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; Insect and mite management, Dr. Richard Cowles; Weed management, Dr. Todd Mervosh. James Preste provided support for the meeting.

EVENTS HELD IN THE COMMUNITY

ANNUAL TOBACCO RESEARCH MEETING

Over one hundred and twenty people attended the Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the Suffield High School Auditorium on February 17, 2009. Dr. Jim LaMondia and Anne Willard (Interim Director of the Suffield High School Vo-

Ag Program) welcomed growers. The meeting addressed a wide variety of issues of concern to growers. Thomas Rathier spoke about nutrient management in shade and broadleaf tobacco and about tobacco cultural considerations. Dr. Hugh Smith presented information about management of insect pests. Dr. Marcia Trape, Director of the Employee Health and Occupational & Environmental Health Center Clinics at the University of CT Health Center and School of Medicine informed growers about the ongoing Farmworker Health and Safey Project. James LaMondia spoke about research on management of tobacco pathogens including root rots and tobacco mosaic virus and progress of the breeding program for multiple pathogen resistance. Mr. Clif Parker spoke about updates and changes in the Risk Management Program and insurance programs and Ross Eddy of the Farm Services Administration provided updates on FSA services to growers. Mr. Bill Leahey updated growers about progress on issues of concern to the Conn-Mass Tobacco Association and Mr. Gary Keough of the New England Agricultural Statistics Service provided updates on the CT Valley tobacco crop statistics. Michelle Salvas, 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 and over 100 persons received credits. Posters on 'Avoiding Tobacco Mosaic Virus Transmission', 'Tobacco Risk Management', and 'Farm Worker Health and Safety' were presented.

CAES PARTICIPATES IN THE BIG E

On September 24, 2008, Station staff set up and manned a booth at the Big E. Richard Cecarelli, Michael McHill and Rollin Hannan provided fruits and vegetables for display at the Station booth that was very attractive and very well received by the public. They also provided apples to be given out to visitors. Ira Kettle, Rose Bonito, Lisa Kaczenski, Tia Blevins and Vickie Bomba-Lewandoski manned the booth. There were posters on our Specialty Crops Program by Dr. Abigail Maynard and on our Invasive Aquatic Plant Program by Gregory Bugbee and Roslyn Selsky.

CAES EXHIBITS AT CONNECTICUT FLOWER AND GARDEN SHOW

On February 19-22, 2009 the Station had an exhibit table and two posters on honey bee research with live bees at the Connecticut Flower and Garden Show held at the Connecticut Convention Center in Hartford. Visitors to the exhibit received information on numerous research projects going on at the Station. Staff participating in the display were Vickie Bomba-Lewandoski, Rose Bonito, Lisa Kaczenski, Ira Kettle, Stephen Sandrey, and Peter Trenchard.

THE STATION PARTICIPATES IN GATEWAY'S "GIRLS GO GREEN STEM" EXPO

On May 1, 2009, The Experiment Station participated in the "Girls Go Green STEM Expo sponsored by the Community Fund for Women and Girls, of the Community Foundation of Greater New Haven, the Connecicut Women's Education and Legal Fund, and Gateway Community College. More than 100 middle school girls from seven local urban and suburban schools attended the event which was held in North Haven. The Expo promoted the science, technology, engineering, and mathematics (STEM) professions to young women. Dr. Sharon

Douglas organized the Station's participation, which included two hands-on workshops and a booth. Dr. Douglas Dingman wrote the workshop entitled "FSI (Food Safety Investigations – DNA Fingerprinting). He was assisted by Dr. Neil Schultes and Ms. Vickie Marie Bomba-Lewandoski. The second workshop was entitled "What is Your DNA Alias?" and was written by Dr. Sharon Douglas, who was assisted by Ms. Michelle Salvas. Tess Foley staffed the Station booth and distributed information on events open to the public (e.g. the Spring Open House and Plant Science Day, research programs at the Station, the Research Foundation, and opportunities for careers in science.

THE STATION PARTICIPATES IN THE THIRD ANNUAL NORWALK-WILTON TREE FESTIVAL

On May 16, 2009, several Station staff members represented the Station at the Third Annual Norwalk-Wilton Tree Festival at Cranberry Park in Norwalk. The event was held to teach children and their parents about trees, exotic insects, and honey bees. The Station had two booths, a reflection of the organizers' recognition of the importance of the Station's contributions to the health of urban trees in Connecticut. Drs. Douglas Dingman, Sharon Douglas, Robert Marra, and Claire Rutledge, along with Lisa Kaczenski and Ira Kettle, gave demonstrations about honey bees and the Asian longhorned beetle, distributed Station publications, coloring books, and stickers, and other literature to attendees. Over 950 adults and 600 youths participated in the event.

LOCKWOOD LECTURES

Dr. Jeffrey B. Jones

On December 4, 2008, Dr. Jeffrey B. Jones, Professor of Plant Pathology at the University of Florida, Gainesville, gave the Lockwood Lecture "Current Research on Citrus Canker, Bacterial Spot of Tomato and Pepper, and Bacterial Wilt". Dr. Jones is an internationally recognized phytobacteriologist whose research has focused on plant pathogenic bacteria of the *Xanthomonas* genus including biology, taxonomy, and disease management on tomato, pepper, and citrus utilizing conventional and biological control approaches.

Dr. Joseph S. Elkinton

On December 8, 2008, Dr. Joseph S. Elkinton gave the Lockwood Lecture "Winter Moth Invasion of New England". He spoke about his research on population dynamics and biological control of the Winter Moth. Dr. Elkinton is a Professor of Entomology in the Department of Plant, Soil, and Insect Sciences at the University of Massachusetts in Amherst.

FOOD DONATIONS

Lockwood Farm

A total of 9,975 pounds of apples, tomatoes, cabbage, squash, winter squash, melons, peppers and gourds were donated to Casa Otonal in New Haven, CT Foodbank in East Haven, High Meadows in Hamden, St. Ann's Church in Hamden, St. Gianelli's in Middletown, St. Vincent de Paul in Waterbury, and Wesley Elementary School. Produce was generated by Drs. Martin Gent, Abby Maynard, David Hill and the Lockwood Farm staff. The farm staff, Richard Cecarelli, Rollin Hannan, and Michael McHill, distributed the produce to the various agencies.

Valley Laboratory

A total of 5,500 pounds of tomatoes, plums, Chinese cabbage and watermelon grown at the Valley Laboratory were donated to Foodshare of Hartford. An additional 1,200 lbs of pumpkins were donated to Northwest Park of Windsor for the fall country fair event. 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, cornstalks and pumpkins to Windsor High School, 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. William Nail was elected Secretary to the ASEV-ES Board of Directors, July 15, 2008
- Dr. Scott Williams was selected by the Connecticut Department of Transportation as the Technical Representative to the Deer-Vehicle Crash Information and Research Center, September 17, 2008
- Michael C. Thomas was appointed for a five-year term as a Curatorial Affiliate at the Yale Peabody Museum of Natural History, Division of Entomology, October 1, 2008
- Dr. Sharon Douglas was awarded the "2008 Fred Borman Award for Outstanding Professional Urban Forestry" from the Connecticut Urban Forest Council at their 20th Annual Conference in Wallingford, October 23, 2008
- Dr. De-Wei Li started serving as a Member of the Editorial Advisory Board of The Open Mycology Journal, November 2008
- Dr. Jason White was elected Vice President of the International Phytotechnology Society, November 6, 2008
- Dr. Theodore Andreadis was a recipient of the 2008 McColgan Grant-in Aid Award from the Northeastern Mosquito Control Association, December 2008
- Dr. Goudarz Molaei was a recipient of the 2008 McColgan Grant-in Aid Award from the Northeastern Mosquito Control Association, December 2008

- In 2009 Dr. Wade Elmer and his co-editors were awarded the Current Review for Academic Libraries (CHOICE) Outstanding Academic Title Award for their book *Mineral Nutrition and Plant Disease* (APS Press).
- In 2009 the American Phytopathological Society (APS) published a new brochure for their organization. Photos taken by Dr. Sharon Douglas were used on the front cover.
- In 2009 Dr. Jeffrey Ward received the Dr. David M. Smith Outstanding Forester Award, Yankee Division, Society of American Foresters
- In February, 2009 Tess Foley was appointed to the Board of Directors for the Fairfield County Farm Bureau and to the Legislative Committee for the Connecticut Farm Bureau Association (CFBA)
- The Quinnipiac Chapter of Sigma Xi awarded Dr. Jason White the 2009 Research Paper of the Year Award. The paper, entitled "Optimizing Planting Density for Pp'-DDE Phytoextraction by Cucurbita pepo", appeared in Environmental Engineering Science (2009) 26:69-375, April 2009
- Pamela Sletten was chosen by the North Haven Inland Wetlands Commission, of which she is a member, to attend a Land Use Leadership Alliance Training Program. The course teaches participants how to use land-use law, conflict resolution, and community decision-making techniques to accomplish sustainable community development, April 2009
- Dr. MaryJane Incorvia Mattina was recognized by the US FDA at the National Conference of the Food Emergency Response Network (FERN) in Dallas, Texas. She was cited for her contributions to the formation of the FERN and the implementatiuon of the program in the Department of Analytical Chemistry. The Director of the FDA's Forensic Chemistry Center also acknowledged her contributions to food safety and security issues, June 18, 2009

EXPERIMENT STATION ASSOCIATES

BEHIND THE SCENES FIELD TRIP TO YALE'S MARSH BOTANICAL GARDENS AND THE SOUND SCHOOL

On May 12, 2009 the Associates sponsored a trip to the Yale Univesity Marsh Botanical Gardens and to the Sound School to learn about their Aquaculture program. Before the trip Dr. Kirby Stafford greeted the group at Lockwood Farm and gave them an overall update on research being done at the Station. After lunch, the group departed for Yale's Marsh Botanical Gardens where they were given a tour by Eric Larson, Manager of the Gardens. The group then went on to the Sound School where they were met by Tim Visel who explained the Aquaculture Program.

THE PRESS SPEAKS

The July, 2008 issue of Southington Life carried the article "Couple works to seed state's agriculture success" by Mara Dresner. The article focused on the research being done by Dr. Sharon Douglas and Dr. Douglas Dingman. The article described where they came from, how they became interested in science, and what the focus of their research is now.

The July 11, 2008, "Candlewood Lake Authority" carried the article "Weevils Studied as a Measure to Cure Milfoil Problem." The article reported on the ongoing research being performed to clear up a milfoil infestation in Candlewood Lake. The research of Dr. Michelle Marco and others was described.

The July 12, 2008 Connecticut Post carried the article "Some Sick Sycamores: Scientists Say Outbreak of Fungus is Temporary" by John Burgeson. Sycamores across Connecticut developed sycamore anthracnose, a fungus caused by an overly humid spring season. Dr. Jeffrey Ward stated that it is a very bad year for the fungus outbreak, but said "If the tree is healthy, it'll get through it, but if it isn't, it might not." He added that the trees can usually endure a severe anthracnose infection. He said "It's a tough hardwood species – one of the fastest-growing hardwoods – it can reach up to 250 feet tall with a trunk 20 feet in diameter."

The July 20, 2008 New York Times carried the article "Sure, Plant Prices Are Up, But Good Advice is Free" by Gerri Hirshey. Gardeners are finding a higher cost for everything from plant prices to extra delivery charges. The author reported that she was delighted to find a source that was free to gardeners and large producing agricultural operations alike – the services of the Connecticut Agricultural Experiment Station. She reported on the activities of Dr. Sharon Douglas and the Plant Pathology and Ecology Department.

The Record Journal of July 10, 2008 carried the article "Gypsy Moths Return – But in Smaller Numbers" by Susan Haigh. In the 1980's there were massive numbers of gypsy moth caterpillars everywhere in the state. They defoliated millions of trees and were a creepy nuisance to everyone. The caterpillars are back, but not nearly as many, due to a fungus that is killing them off in Connecticut. The fungus was discovered by scientists at the Station, and it has been controlling the numbers of the caterpillars ever since. Dr. Kirby Stafford stated "I think the days of massive outbreaks are over." Forests are still under observation, and defoliation still takes place, but on a smaller scale.

The Greenwich Time of July 29, 2008 carried the article "More Urgency with West Nile Virus" by Meredith Blake. The article reported that the virus was found much earlier this season in more areas of the state. Dr. Theodore Andreadis stated "Hot and humid weather this season has been ideal for *Culex pipiens*, the mosquito that most commonly transmits West Nile virus. If conditions remain that way, there may be a record number of cases in Connecticut. Readers were advised on how to avoid being bitten.

The New Haven Register of July 30, 2008 carried the article "Summer Safety". The article reported that mosquitoes carrying the West Nile virus had been found. It went on to inform readers how to avoid being bitten.

The New Canaan Advertiser of August 14, 2008 carried the article "West Nile Found Here" by Kimberly Nevas and Colleen Flaherty. For the first time in five years mosquitoes found in New Caanan in Hoyt Swamp were found positive for West Nile virus. The mosquitoes that tested positive, *Culex restuans*, is a bird biting mosquito that will occasionally bite humans if bred in close proximity, was not thought to pose a major threat to people in the area.

The August 28, 2008 Hartford Courant carried the article "Skeeters Hanging Around" by Steve Grant. Heavy rains in the beginning of August have caused a large influx of mosquitoes at a time when they should be tapering off. Dr. Theodore Andreadis stated "Overall abundance of mosquitoes usually peaks in early July and then tapers off through August and September. This week, the numbers of mosquitoes in the traps is running 1 ½ to 2 times what the average has been for more than a decade." He recommended wearing light colored clothing and using repellants to ward off mosquitoes.

The August 29, 2008 New Haven Register carried the article "Scientists Studying Common Lyme Strain" by Abram Katz. Researchers at Stony Brook University Medical Center doing research on the spirochete that causes Lyme disease found more than 100 strains of the bacterium. One in particular is more aggressive than the others and causes a more severe case of Lyme disease in some people. Dr. Louis Magnarelli stated that the research published was interesting and possibly important. He stated "This is a question that has been unanswered for 20 years. Some patients have a severe course and others have mild cases. Are the people genetically different or are the strains genetically different? I think the answer is both." He also stated that testing the hypothesis that the common strain accounts for more virulent disease would be difficult. "Finding and isolating the *B. burgdorferi* in patients is not easy. The bacteria does not settle in joint or spinal fluids, nor do large numbers circulate in blood".

The August 29, 2008 Republican American carried the article "Meet the Beetles/Asian Longhorned Could Infest State", by Quannah Leonard. Asian Longhorned Beetles have been found in Worcester, MA and state officials are worried it can soon infest trees in northern Connecticut. It could be a major threat to the state's maple syrup, nursery and forest products industries. Dr. Kirby Stafford stated that there was nothing that could be done once the beetles infest a tree. It would need to be chipped and burned to stop the spread to others trees. He said people should not try to mail live suspected specimens to the Station for identification. They should be frozen for at least 2 days to kill them first, as the insects can eat through a box or plastic and escape.

The September 22, 2008 New Haven Register carried the article "Winery Drops Plan to Appeal Town Cease Order" by Stan Fisher. Chamard Vineyard in Clinton is in transition. The article stated that Station scientist have examined its vineyard and concluded that the vines are healthy and will be able to produce grapes in the upcoming season.

The September 28, 2008 Hartford Courant carried the article "Reviving the 'Perfect Tree'" by David K. Leff. The article described the chestnut plantation at Sleeping Giant Park and the different species of chestnut trees in it. Dr. Sandra Anagnostakis' work was described also and the importance of the chestnut orchard was stressed.

The October 1, 2008 Hartford Courant carried the article "Sugar maples' Colors Go Sour" by Steve Grant. Sugar maples across the state are afflicted with an unusual fungal disease 'fungal leaf spot' that causes the leaves to turn brown and fall off the tree. There was a question on how it would affect fall foliage color. Dr. Sharon Douglas stated "There is a lot of concern, a lot of phone calls, a lot of samples coming in". She stated the fungus was unusual for us, but not unheard of, but the 2008 season is the worst she has ever seen. But because not every tree has the fungus, and because there is a large number of other species of trees and bushes, the foliage will not be a total loss.

The November 7, 2008 New Haven Register carried the article "Expert to discuss invasive aquatic plants." Greg Bugbee was scheduled to give the talk "Connecticut's Invasive Aquatic Plant Problem" on November 13, 2008 at Clarice L. Buckman Theater at Quinnipiac University. The article said he would discuss how the spread of invasive non-native aquatic plants are threatening Connecticut's most valuable lakes and ponds.

The December 5, 2008 New Haven Register carried the following letter on their Editorial Page. The letter was written by Pamela Weil, President of the Experiment Station Associates. "The Connecticut Agricultural Experiment Station has been helping state residents since it was founded in 1875. The Station is a state-supported scientific research institution dedicated to improving the food, health, environment and well-being of residents. One of its jobs is testing consumer products for unwanted and, perhaps, dangerous ingredients. For example, Station scientists recently discovered a pesticide in Nestle's Farinha Lacteal toddler cereal imported from Brazil and melamine in White Rabbit Cream Candy and Lotte Koala March Biscuits, both imported from China. The Associated Press story "Tainted candy found in Connecticut" did not mention that the melamine in White Rabbit Cream Candy as found and identified by Station scientists. We think it is important that readers know that scientists at the Connecticut Agricultural Experiment Station were responsible for making the determination of melamine in this and other products sold in our state."

The January 8, 2008 Hartford Courant carried article "Artificial Turf's Safety to be Assessed" by David Funkhouser. The article reported that there is a question of safety of materials used in installing artificial turf sports playing fields at area schools. The use of tire "crumbs" is becoming more common in the building of the fields. Opponents are worried about chemical used in the manufacturing of the tires will leach out into the ground and onto the players who use the fields. Several agencies, including the CT Agricultural Experiment Station, will be studying the components of the materials and how they react in the environment. They will try to determine if using the fields built with these "crumbs" will harm the health of the students who use them.

The New Haven Register of January 12, 2009 carried an editorial comment "Get the Dirt on Fake Grass". Artificial turf for sports fields made from tire "crumbs" has become controversial. Further studies of the materials used need to be made before the fields can be declared "safe" to use. The Station will be involved in the studies, determining what toxins are released into the air and possibly onto players using the fields in every day conditions. A previous study by the Station found that summer temperatures cause the rubber to release vapors, including one that's a known carcinogen. Other chemicals found have been linked to asthma, and eye and skin irritations. The Station will be working with the Department of Environmental Protection, the Department of Public Health and the UConn Health Center on the study which will last a year.

The New Haven Register of January 30, 2009 carried the article "Agency works to keep food safe" by Ed Stannard. An Open House at the Analytical Chemistry Department on January 29, 2009 showed off the department's abilities in identifying potential toxins in food and other products. The Analytical Chemistry Lab is part of the U.S. Food and Drug Administration's Food Emergency Response Network. To create a profile of different toxins to be able to detect them, different toxins are added to foods and then a method is created to detect that particular toxin in foods. Dr. Christina Robb stated "When it comes to food-borne toxins, the task is to determine what's the best way of finding it that will give us a quick result, fast preparation, fast analysis. What we find is that some techniques are better than others." Dr. MaryJane Mattina, Department Head for the Analytical Chemistry Department, is working on making the lab better known to other state agencies, the federal government, and state residents. She wants to change the name of the lab to The Food, Environmental, and Product Safety Laboratory, a name she says better describes the lab.

The Connecticut Post of January 30, 2009 carried the article "At forefront of science, agency seeks name change" by Frank Juliano. The Analytical Chemistry Department of the Station has taken on added federal and state responsibilities, including becoming one of the only state labs in the nation to participate in the national Food Emergency Response Network (FERN). New equipment supplied by federal funds to do analyses on food and other products to detect toxins has greatly expanded the capacity of the department. The lab has detected melamine in food products from China, lead in toys exported from China, antifreeze in toothpaste exported from China, and is also working on projects like detecting levels of toxins and carcinogens given off by tire "crumbs" used to install sports fields. Because of the newly expanded capabilities and responsibilities of the Analytical Chemistry Department, Dr. MaryJane Mattina suggests the name of her department be changed to The Food, Environmental and Product Safety Lab."

The Record Journal of February 9, 2009 carried the article "Environmentally friendly methods of plant diseases". Dr. Sharon Douglas gave the talk "Environmentally Friendly Methods for Management of Plant Diseases" to the Wallingford Garden Club on January 13, 2009. Her presentation, which discussed steps for disease prevention, was very well received by the members. She gave many tips and explanations of what goes on with plants for the gardeners.

The Greenwich Time of March 3, 2009 carried the article "State to tag deer with GPS monitors" by Meredith Blake. Dr. Scott Williams is conducting a study of deer behavior to determine how often and when they cross the Merritt Parkway, and will use the results of the research to help

solve the problem of deer/car collisions along the roadway. The study will run for a year and will be using GPS monitors to track the deer. Dr. Williams said the research will help engineers create safer roadways and better target areas where deer are most problematic.

The Connecticut Post of March 16, 2009 carried the article "Waging war on invasive plants" by Keila Torres. The DEP is offering towns and cities grants to get rid of the non-native plants that have cropped up and taken root in their communities. Dr. Todd Mervosh stated that the invasive plants have "become a widespread problem around the state. There are a lot of animal species that coexist with the native species, that depend on them". Many groups around the state will begin to seek out and eliminate the invasive plants.

The North Haven Citizen of March 20, 2009 carried the article "Garden Club brings benefits of organic gardening to the public" by Paul Colella. The North Haven Garden Club invited Dr. Kimberly Stoner to give her talk "Organic Vegetables and Protecting Them from Insect Pests". She spoke of the benefits of organic gardening, soil preparation, and disease prevention. She helped gardeners new to organic gardening to get started in a new way of growing vegetables.

The Record Journal of March 23, 2009 carried the article "The best veggies". Dr. Martin Gent gave a talk on his years of research with the Station to the Y's Men of Meriden meeting. The article discussed his work in growing plants in greenhouse conditions.

The Yale Daily News of March 23, 2009 carried the article "Bedbugs make an unwelcome appearance in Lanman-Wright" by Esther Zuckerman. An isolated incident of finding a bedbug in a Yale dorm occurred. The University staff moved quickly and stopped an infestation before it started. Dr. John Anderson stated that there has been a big increase in bedbug incidents in Connecticut over the past year. Prior to the 1940's and 50's bedbugs were common. But, he stated, with the use of DDT, bedbugs were eradicated. The increase in their numbers may be because DDT has been banned from use. Or, the increase may just be a cyclical increase.

WFSB Channel 3 News carried the story "Group Works to Restore Chestnut Trees – posted on the Web on March 24, 2009. The story related the work involved in restoring American chestnut trees to the prominence they once held in the state's forest and how Dr. Sandra Anagnostakis has spent the last 30 years developing blight resistant chestnut trees.

The Fairfield Minuteman of April 15, 2009 carried the article "Town Deer Management Program Under Consideration" by Brigid Quinn. The article reported on a meeting of the Fairfield Conservation Commission whose members were investigating whether there is a deer population problem in Fairfield and then seek realistic recommendations. Dr. Scott Williams was an invited expert asked to address the group. He spoke about research related to the impact of the overabundance of deer within the forest ecosystem and damage done to the ecosystem.

The Day of April 16, 2009 carried the article "Scientist on mission to bring back the once-abundant chestnut tree" by Judy Benson. In the early 19th Century, the American chestnut was nearly brought to extinction by a fungus brought over in a shipment of grafted chestnuts from the

orient. Dr. Sandra Anagnostakis has worked tirelessly for the last 30 years to bring the American chestnut back to its former glory. The article described the history of the chestnut blight and Dr. Anagnostakis' research to produce a blight resistant American chestnut.

The Hour of May 18, 2009 carried the article "Norwalk PTO Shines Spotlight on Lyme Disease" by Lauren Mylo. Dr. Kirby Stafford gave a talk for the Norwalk PTO about Lyme disease, the rise in numbers of cases, when people usually contract it, and other important facts about the disease. The town is trying to get more information out to the public to try to stem the number of cases in the region.

The New Haven Independent of May 27, 2009 carried the article "They're Putting the "Elm" Back in "Elm City" by Thomas MacMillan. The article described an experimental program being conducted by the Garden Club of New Haven to try to propagate disease resistant trees from seedlings found in the city that appear to be from disease resistant trees that survived the Dutch Elm Disease outbreak in the mid 20th century. The Garden Club has asked the assistance of Dr. Sandra Anagnostakis who stated "I think it's an excellent project. The program is especially valuable because, having four chromosomes, American Elms cannot be cross-bred for disease resistance with other elms, which have only two chromosomes. This is a fabulous chance".

The Hartford Courant of May 31, 2009 carried the article "Sentinels of a Rich Past, Present" by Tom Condon. The article described the tobacco industry of the Connecticut Valley. In the past, tobacco was being grown on 30,000 acres in the state. Now only about a tenth of that acreage goes to growing tobacco. Many of the tobacco farms were sold to developers. Dr. Tom Rathier stated that the glacial soils in the Valley can grow many kinds of plants. Some vegetables are grown on former tobacco land. He said that when a tobacco farmer calls it quits, it would be good if the state's farmland preservation program were in a position to buy the property for fruits and vegetables. With an extreme drought in the West, more locally grown food may become important.

The Stamfordplus.com site carried the article "State Mosquito Program Announces Start of Mosquito Testing for West Nile and Eastern Equine Encephalitis Viruses" by the Department of Public Health. The article stated June 1, 2009 was the date the mosquito surveillance program, run by the Station would begin for the summer season. The program tests mosquitoes for West Nile Virus and Eastern Equine Encephalitis.

The Hartford Courant of June 4, 2009 carried the article "Taking a Bite Out of Bedbug Problem" by Grace E. Merritt. The past few years have seen a resurgence of bedbugs in Connecticut. Dr. Gale Ridge explained that "they were basically eradicated in the United States in the late 1940s with the use of DDT, but within the last 10 to 15 years, there has been a resurgence because of increased travel." She also stated that bedbugs first began to show up in the hospitality industry and can be found in places with moving populations, such as apartment buildings, public transportation and airports. Advice on how to eradicate them from homes was given.

The Hartford Courant of June 16, 2009 carried the article "Recent Weather A Bug's Idea of Bliss" by Elizabeth Sile. A long span of wet, cool weather has helped to increase populations of insects, particularly mosquitoes and ticks. Dr. Theodore Andreadis stated that mosquitoes thrive in moist, cool conditions. He stated "More rain, more flooding, more mosquitoes". He also reported that the number of mosquitoes trapped throughout the state has been much higher this spring. Dr. Kirby Stafford also reported a higher number of ticks in the state. He stated that they, too, thrive during wet weather patterns.

The Daily Green of June 16, 2009 carried the article "Colony Collapse Disorder Research is (Finally) Gearing Up". The article reported on how $4.1 million in federal honey bee research money was being spent. The Connecticut Agricultural Experiment Station is receiving a portion of the funds. The Station will receive specimens from the cooperators in the program and will examine the pollen and wax samples to look for residues of agricultural pesticides. The problem is being researched from all parts of the country.

The Hartford Courant of June 24, 2009 carried the article "The Agony of the Ivy", by William Weir. The article reported on the observation that poison ivy has gotten worse in the state. Dr. Sharon Douglas stated "We're seeing a trend for more – and more extensive – poison ivy that's been going on for several years … Unfortunately it grows very well under many circumstances." She also stated that poison ivy is very forgiving – its grows under all kinds of conditions. It will thrive in either moist, rich soil or poor soil. The article also discussed treatment for poison ivy.

The New Haven Register of June 26, 2009 carried the article "Public Asked to Leave firewood at Home When Camping" by Register Staff. In summer many campers, vacationers and residents transport firewood from its original site into Connecticut. Officials from the DEP and the Station were asking them not to bring any wood from surrounding states into Connecticut. Asian Longhorned beetles are only 20 miles from the Connecticut border in Worcester, MA, and have also been found in New York City and New Jersey. The state is doing everything it can to keep the pest out of Connecticut. It was requested that suspected beetles be brought to the attention of the Station.

The Connecticut Post of June 29, 2009 carried the article "Season's First Native Corn Pops, Despite Rains" by John Burgeson. The article reported that despite a wet, sunless spring many farmers are reporting their crops are doing very well. The state's sweet corn crops, as well as many other types of crops are flourishing, and many of them are early. There are other crops, however, that are not faring so well in the wet conditions. Flowers and some fruit trees which are sun loving are not doing well. Dr. Sharon Douglas stated "Some people are pleased with the way the season is going, but others are having problems". "Warm-weather, sun-loving plants are not thriving as well." She said that apple orchards, which require spraying, are not doing as well because the weather hasn't been good for spray operations. Many homeowners are going to her Plant Pathology department with problems with flowers and trees, many of which are being caused by fungal diseases.

The Hartford Courant of June 30, 2009 carried the article "Asian borer poses threat to ash trees". Another deadly pest to trees is close to entering Connecticut. The insect is in New York, and

Rose Hiskes stated “There’s actually a closer infestation in Mifflin, PA. If the pest enters the state it could be the final blow to the state’s ash trees, as they are already plagued by two diseases – ash yellows and ash anthracnose. Rose Hiskes stated “It’s one thing after another … If the borer starts killing them it will be the final nail in the coffin.”

THE PUBLIC SPEAKS

On July 7, 2008, Julie Gauld, Secretary of the Massachusetts Christmas Tree Association, wrote the following to Dr. Richard Cowles. "On behalf of the Massachusetts Christmas Tree Association and the New England Christmas Tree Alliance, thank you for participating in our 50th anniversary celebration. We really appreciated your presentation, which was very interesting and informative. In spite of the noisy rain storm, the response to your program was very positive, and the many growers there got timely information from your research. … Thanks once again for a great contribution to the success of our 50th conference."

On August 1, 2008, Lisa Robin wrote the following to Rose Hiskes. "I had actually spoken with someone at your office and she was very helpful. As it turns out there was the standing grey water underneath the kitchen sink and then they started to cut up the floor and found a dry well smack in the middle which was percolating up and rotting the layers of wood and about 3-4 layers of flooring – full of rotting wood and mold! The kitchen has been gutted completely, flooring up, power washed with bleach and most of the lower layers of sheet rock removed. A new cement floor poured today, waiting for drying and then a new floor on top and then they'll put it back together with the new cabinets. Its been crazy and I haven't been able to sleep here. Not a fun time, but your office has been great in guiding me and advise – so I truly appreciate it all. I'm hoping the bugs are gone forever – so it turned out to be a sewer drain issue after all, which my landlord kept saying 'they're not coming up from the drain" … Thank you very much."

On August 1, 2008, Jill Casertano, Secretary of Boulder Knoll, wrote the following to Dr. Kimberly Stoner. "On behalf of the members of Friends of Boulder Knoll, I want to thank you sincerely for your recent membership renewal to Friends of Boulder Knoll, our ongoing leadership, loan for the payment of our annual insurance premium, and all that you do to support and encourage our organization. As we move forward with efforts to cultivate the land at Boulder Knoll Farm and develop educational programs related to sustainable living and responsible stewardship of open space, your funds will provide critical financial support, and your leadership and participation will help accomplish our goals. Thank you again for all that you have done, and for continuing to bare the torch for Boulder Knoll Community Farm."

On August 11, 2008, Jack Kittredge wrote the following to Dr. Kimberly Stoner. "Thanks very much for your presentation at the just-concluded 2008 NOFA Summer Conference. … As you are aware, the heart of the conference is the willingness of presenters to share their knowledge with others. We appreciate your participation and hope you will consider presenting again next year. Thanks again for your participation."

On August 30, 2008, Chris Donnelly, CTPA Secretary-Treasurer, wrote the following to Dr. Richard Cowles. "On behalf of the Connecticut Tree Protective Association, I thank you and Carole Cheah on a well-prepared and well-received talk at our recent Summer Meeting. I am enclosing a copy of the evaluation form for your session – you can see that the response overall was very positive. CTPA has a strong appreciation for the close relationship that we enjoy with the Connecticut Agricultural Experiment Station. We recognize our good fortune in being able to

ask scientists such as yourself to provide information to those who work in the field – to let us know what is the latest knowledge and what might be useful to the practitioners and to the public at large. We are grateful that you responded to our request with such dedication, enthusiasm and professionalism. That carries a long way. Good luck with your continued work on insect pests and their control. Please let us know if there is any way that we can provide a similar service in support of the Station's work."

In September, Robert Heffernan, Executive Director of the Connecticut Greenhouse Growers Association, wrote the following to Dr. Victoria Smith. "Our growers listened intently to you when you gave your update at our evening program at Lockwood Farm a few weeks ago. You've got so much patience with all our members – we're thankful for all you do. You invested a lot of personal energy and we're grateful to have you on our program."

On September 4, 2008, Ashley wrote the following note to Dr. Kimberly Stoner. "I wanted to thank you for making it to the CT Lawn & Turf course despite your chin injury! I hope it's gotten better. You do a wonderful job in presenting reasons why professionals should be using organic methods and it is always a pleasure to hear you speak. Mike was especially excited to have you in CT and raved about your presentation. I'm very glad you could make it! Thanks again."

On September 5, 2008, Richard Huntley wrote the following to Dr. Sharon Douglas. "I appreciate your prompt and comprehensive answer by phone and e-mail to my questions on Powdery Mildew. It certainly covers the subject in detail that is easy to understand. I will be using this information to treat the problem and, hopefully, eradicate it. Thank you very much.

On September 17, 2008, Richard Kiyomoto, Adjunct Professor for the College of Agriculture and Natural Resources at UCONN wrote the following to Dr. Wade Elmer. "Thank you for teaching the PLSC3810 lecture and the lab sections today. Your expertise and many samples you brought in for students to examine were greatly appreciated. I especially appreciate the fact that you took the time to make certain students were able to view all aspects of Fusarium morphology and it was an added bonus that you had students sample tissues for plating onto selective media. We will be devoting a future lab to culture media and techniques in isolating fungi from tissues so this start was perfect. On behalf of the 9 students in the class, the class TA Tim Brosnan, and myself – Thank You."

In September 20, 2008, Pam Sawyer wrote the following to Dr. Kirby Stafford. "I believe the show went quite well with your expertise on both ticks and the long-horned beetles. One of the highest compliments I get is when my youngest camera person says "it was really interesting!" Not bad for a talking head style show. … Again, my gratitude for being the guest star."

On September 26, 2009, Gregory A. Foran, President of the Tree Wardens Association of CT wrote the following to Dr. Victoria Smith. "…Tree identification being a light subject and one that always leaves us humbled was suddenly overshadowed by your presentation on the Asian Longhorned Beetle and the potential devastation that would occur should this pest find its way into any of our communities. It is certainly on our doorstep with the recent discovery in

Worcester. While we still had a picture perfect day, I think your photos were a sufficient reminder of how the pastoral feel of the venerable Connecticut College and many treasures like it could be forever changed should we not all be diligent as you and your associates are in doing all you can to manage the ALB and other pests which come our way. As you said, it all begins with knowing the host tree species and being able to identify them, so it all ties in. I especially appreciate your making yourself available on such short notice and compressing your presentation into a narrow time slot. Based on the way the questions were going, it is obvious that you had the attention of the audience and indeed the whole industry as you sort your way through this crisis. While I am truly grateful for your willingness to share your time with us, and while your presentation and handouts certainly were excellent, we should be even more grateful for your work and that of all the staff at the Experiment Station. Your constant everyday efforts to improve the state of arboriculture and to educate all of us in the field are especially critical and appreciate when we see it in the context of times like these! Again, thank you for finding the time to make our workshop a success – and timely too!"

On October 3, 2008, Jill Casertano, Secretary of Friends of Boulder Knoll, wrote the following to Dr. Kimberly Stoner. "On behalf of the members of Friends of Boulder Knoll, I want to thank you sincerely for your participation in our recent event, Learn Today, Grow Tomorrow. Your talk about the process of starting an organic garden was warmly received by our attendees and we are thankful that you were able to present to them. The energy and time that you committed to this event and Friends of Boulder Knoll helped to make this first on-site educational event a great success. Thank you again for all that you have done, and for continuing to bear the torch for Boulder Knoll Community Farm."

On October 11, 2008, Joseph Giaimo, President of Crest Termite Control, Inc., wrote the following to Dr. Gale Ridge. "Just wanted to thank you again for your wonderful bedbug presentation at our Fall Seminar. It was a smashing success! It was the largest attended session by far and the information presented was invaluable. It was great to have you on the program. If you are interested, maybe we could include you in the program for next year. Until then – sleep tight and … never mind! Thanks again."

On October 18, 2008, Don Bergquist, General Manager of Suburban/Magic Exterminating Company, wrote the following to Dr. Gale Ridge. "Your contribution to this year's Eastern Conference was absolutely exceptional. My staff and I were very impressed with the topic on delusory parasitosis. Would you consider sending us the slide presentation for our in house training as I believe our technicians would benefit greatly from it. We have had many situations with customers on this point and need desperately to better educate our staff on how to handle these situations."

On October 21, 2008, Karen P. Bennett, Extension Professor and Specialist, Forest Resources, University of New Hampshire, wrote the following to Dr. Jeffrey Ward. "Time has flown, but our thanks are just as sincere. Thank you for your great presentation – inside and out – on 'Crop circles: Rethinking Stand Management' at Bringing Research to New Hampshire's Forest at Fox Forest on September 19. Fifty foresters attended. One attendee said it was one of the better

workshops we have held recently. You had a different perspective and people appreciated that. Your participation helped make this workshop a success."

On October 22, 2008, Laura Falanga, Procurement & Programs Assistant for the Connecticut Food Bank, wrote the following to Richard Cecarelli. "I wanted to send a quick note to say thank you on behalf of not only the Connecticut Food Bank, but also on behalf of all those that are food insecure in Connecticut and wouldn't know where their next meal came from if it weren't for farms like yours. We appreciate the generous donations you have made of produce. We value your willingness to go above and beyond the call of duty to help us out. Please keep us in mind and feel free to contact us any time! Thank you for making a difference."

On October 23, 2008, Magdalena Z. Mendez, FSW, State of Connecticut, wrote the following to Dr. John F. Anderson. "I just wanted to personally thank you once again, for your initiative and support in helping us with the Santos family's insect issues. Please, also give my most sincere thanks to Dr. Gale Ridge for her assistance in the insects investigation. You guys are wonderful and a great resource to the CT communities."

On October 30, 2008, Candee Cochran e-mailed the following to Rose Hiskes. "Thank you. That was helpful since there is so much information on the internet. I just wanted to narrow down the facts!"

On November 7, 2008, Ron Wenzel of the Connecticut Maple Producers wrote the following to Rose Hiskes. "Your presentation was excellent!!! Your presentation and specimens were more than what I expected. No specimens in Mass. This would have made that presentation almost as good as yours, well maybe not. You have raised the bar as I have tried to do as President of the Association. If I hear of anyone wishing to learn more about the ALB your name and e-mail will come forth from me. You need to request more than a half hour. All of your materials went as fast as you did, so we will need more on the 17th of January. Let us know about getting the small handouts so we can give them to the general public. Again, thanks for today. You made me look good – not an easy thing to do – and you made yourself known to us. Hope to see you in January, North West Park, Windsor."

On November 7, 2008, RICHC74 e-mailed the following to Rose Hiskes. "Thank you very much for your time and information. Its been very helpful."

On November 12, 2008, Bonnie Simon wrote the following to Dr. Kimberly Stoner. "Thank you for presenting your story and sharing your knowledge and enthusiasm at the Scott Pond Women in Science Seminar at NYCC. Students are still thanking me for your words of wisdom."

On November 16, 2008, Judith Fine wrote the following to Mary Inman. "Thank you so much for the speedy information about the groundsel bush. I think you are the one who helped me last year with a periwinkle-specific disease. Yours is such a marvelous service. Now that you helped identify the groundsel bush for me, I've been able to find it other places – like my

grandmother's gardening book – the first edition of Bush Brown, copyright 1939. I will certainly try to propagate it in my garden. It is a beautiful shrub."

On November 20, 2008, Richard McAvoy, 2008 NEGC Program Chair for the New England Greenhouse Conference & Expo, wrote the following to Dr. Wade Elmer. "On behalf of the New England Floriculture, Inc., I thank you for helping to make the 2008 New England Greenhouse Conference a success. It is the enthusiastic support of the conference speakers that make the educational program so appealing to our adudience. I wish to thank you for your efforts in developing the sessions entitled "Bio-Control Options for Root-Rot Diseases" and "Managing Plant Nutrition to Limit Disease Susceptibility" as well as for your participation in the "Ask the Expert" program and for the cooperation you provided during the planning and organization of this event."

On November 20, 2008, Richard McAvoy, 208 New England Greenhouse Conference and Expo Program Chair, wrote the following to Dr. Sharon Douglas. "On behalf of New England Floriculture, Inc., I thank you for helping to make the 2008 New England Greenhouse Conference a success. It is the enthusiastic support of the conference speakers that make the education program so appealing to our audience. I wish to thank you for your efforts in developing the session entitled "What We Need to Know About Powdery and Downy Mildews on Greenhouse Crops" as well as for your participation in the "Ask the Expert" program and for the cooperation you provided during the planning and organization of this event."

On November 24, 2008, Roger Senserrich, Education and Outreach Coordinator and Heidi Green, President of 1000 FRIENDS of Connecticut wrote the following to Dr. Kimberly Stoner. "Tying it all Together: Transit, Jobs & Housing, 1000 FRIENDS of Connecticut's Second Annual Statewide Smart Growth Conference was a success! The evaluations were glowing. Attendees enjoyed the camaraderie, delving into the issues, and debating the questions. We could not have put together this conference without your help! Thank you for the role you played in organizing and leading the "Getting Local Food To Where People Are" workshop. Your contribution greatly added to the success of our efforts to advance change where and how Connecticut grows. Your workshop received very positive reviews. We hope to see you next year at 1000 FRIENDS of Connecticut's Third Annual Statewide Smart Growth Conference. Thank you again for adding your voice to the growing chorus to grow Connecticut smart. With sincere appreciation…"

In December, 2008, Robert V. Heffernan, Executive Director of the Connecticut Nursery and Landscape Association wrote the following to Dr. Sharon Douglas. "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 a most successful winter meeting, thanks to your expertise. 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."

In December, 2008, Linda Elgard, corresponding Secretary of the Hadlyme Hall Garden club wrote the following to Dr. Kirby Stafford. "Thank you for your informative talk you gave the Hadlyme Hall Garden Club last month. It was greatly appreciated by all in attendance."

In December, Page Ezepigor, NOFA OLC Program, wrote the following to Dr. Claire Rutledge. "I wanted to thank you for speaking at the Update Course. Nearly all of the 80+ evaluations we received listed you as their favorite speaker. You did a fantastic job sharing very pertinent information and I can't thank you enough."

On December 5, 2008, John S. Arnold of J&J Farms, LLC, David E. Arnold of Robert Arnold Farms, Inc., and Thomas W. Arnold of T.W. Arnold Farms, LLC wrote the following to Dr. James LaMondia. "We're writing this letter to you to thank you for the "sample" of the B-2 variety of Broadleaf tobacco seed that you have been developing in recent years. This variety grew vigorously in the field – much larger than our commercial varieties. The 3 farms that we represent grow 120 acres of tobacco here in the Valley. When we consider the challenges we face each growing season with Blue Mold, TMV, Fusarium Wilt, and nematode root damage – all of which the B-2 seed has resistance to – this variety has distinct advantages for getting a full and quality crop to market. We understand the effort it requires (labor and other inputs) to produce any amount of the seed. When we think of the cost of lost yield, lower quality and fumigation costs, we're willing to buy the seed in order to get sufficient quantities of seed to grow it commercially. If you have any questions or a need for further input please don't hesitate to call."

On December 10, 2008, Dr. Daryll C. Borst, Professor of Biology of 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 presentation on the history of *Phytopthora ramorum* and the importance of how it has spread to the nursery industry and the ecological implications that it could have on the Oak trees in our forests supported my lectures on invasive pathological organisms. I am a firm believer that understanding the history of a scientific problem is crucial to its solution. Because molecular research is becoming more popular in many of the advanced courses at Quinnipiac, your discussion of how molecular biological procedures such as ELISA, have become critical tools in the accurate, quick identification of the pathogens was most appropriate. 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 10, 2009, 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 make arrangements for your colleagues to present their work to my botany students. Your introductory overview of the Station and your talk about the historical impact of plant pathogens

such as late blight of potatoes and coffee rust, underscored to my students how relevant the work that the Plant Pathology and Ecology section at the Station is to their daily lives. The work of you and your colleagues at the Station always provides my students with new career possibilities that they were not aware of. Thank you again for your efforts on behalf of my botany students."

On December 22, 2008, Governor M. Jodi Rell wrote the following to Dr. Louis A. Magnarelli. "I would like to take this opportunity to thank you for your help in decorating the Residence for the holiday season. The decorations get better and better each and every year! Everyone who visited the Open House, and even those who came for meetings, truly enjoyed seeing the beautiful holiday displays. Again, thank you for your dedication and hard work in making this holiday season so special. I truly appreciate your effort."

In Winter, 2009, Robert Heffernan, Executive Director of 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 a most successful Winter meeting, thanks to your expertise. We salute you for all the energy and effort you put into making our 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 Board of Directors join me in sending our warmest appreciation to you. Thank you!"

On January 7, 2009, Dennis Kocyla, President, and Sally Kocyla, Program Chair, of the Naugatuck Valley Audubon Society wrote the following to Dr. Jeffrey Ward. "The Naugatuck Valley Audubon Society was very happy to see you and have you again as our speaker. Your informative slide presentation, Controlling Deer Browse Damage in Home Gardens, was enjoyed by all. You gave us much information and your five-step strategy taught us how to limit browse damage in our home gardens. On behalf of the Naugatuck Valley Audubon Society, thank you very much for giving a wonderful program."

On January 7, 2009, Dennis Kocyla, President, Naugatuck Valley Audubon Society, wrote the following to Dr. Kimberly Stoner. "On behalf of the Naugatuck Valley Audubon Society, thank you for the wonderful power point presentation you gave on Alternatives to Insecticides for Managing Vegetable Insects. Your alternatives to insecticides on plants in the cabbage family, the nightshade family, cucurbit family, and the legume family were interesting and very informative. We dislike insecticides and were happy to learn all we could on natural management of vegetable insects. It was great having you again as a speaker. Thank you for coming."

On January 13, 2009, Maggi Shaw wrote the following to Dr. Kirby Stafford. "Thanks so much for such an informative answer. It makes perfect sense about the ticks not being a threat from the mice. I always appreciate your knowledge and how much your research and information has helped me understand issues regarding tick-borne diseases."

On January 20, 2009, Faith Kuehn wrote the following to Dr. Victoria Smith. "Just wanted to relate that my family was impressed with your ALB talk at the recent meeting of the CT Greenhouse Growers Association. Now before you get paranoid that I'm sending spies … my niece, Sara Blersch (Daffodil Hill) was elected as Treasurer and my brother and sister-in-law went along for the festivities. My brother was simply amazed at the damage caused by ALB, and told me all about your talk."

In February, 2009, Stacy Mathieu of the Orchard Valley Garden Club wrote the following to Dr. Kirby Stafford. "Thank you for your presentation today at the Orchard Valley Garden Club. Your interesting talk and slides were very informative. The handbooks will be great for the members to use as a resource. Thanks again."

In February, 2009, Robert V. Heffernan, Executive Director of the Connecticut Greenhouse Growers Association and the Connecticut Nursery and Landscape Association, wrote the following to Dr. Kirby Stafford. "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 a most successful Winter meeting, thanks to your expertise. 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 February 2, 2009, Stephen Wing, Landscape Architect, ASLA wrote the following to Dr. Claire Rutledge. "Thank you again for your fascinating presentation Saturday morning! Your enthusiasm for your subject matter is infectious. You didn't loose a single listener as far as I could tell. I know I learned a lot – and some things I probably should have known (Douglas Fir as an alternate host for spruce gall adelgid, for example."

On February 2, 2009, Katherine Neville wrote the following to Dr. Claire Rutledge. "Your talk on insects etc. at the Milford Library was just wonderful! I spoke to a few other people that attended and everyone so enjoyed your presentation – BRAVO!"

On February 2, 2009, Ann Gibbs, State Horticulturist, Maine Department of Agriculture, wrote the following to Dr. Victoria Smith. "Just wanted to let you know I'm pilfering slides from your ALB talk and you did a great job. I think we should use it as the basic talk for all."

On February 4, 2009, The Romanowskis of Darien, CT, wrote the following to Dr. Gale Ridge. "Thank you for your help in identifying the firebrats as the "problem" in our home. We are now comfortable to not have any more pesticides applied since they're "harmless" insects. The world is a better place and sings because of it."

On February 11, 2009, Nancy L. Carrington, Executive Director of Connecticut Food Bank wrote the following to the staff of the Station. The letter was in response to a $200 donation from the Station staff at Christmas – the results of a raffle at the holiday party. "Thank you very much for your gift of $200.00 to support Connecticut Food Bank's mission to alleviate hunger. Over the past 26 years, Connecticut Food Bank has built a bridge between those who have an abundance of food – farmers and the food industry – and people who are hungry or unable to afford adequate nutrition. We have become an essential part of nearly every community in our six-county service area, serving as a centralized warehouse to receive large quantities of donated food for distribution to a network of 650 charitable programs that feed people in need. No one person alone can solve the problem of hunger. We work together – Connecticut Food Bank staff, Board of Directors, member programs, food and financial donors, volunteers and the media – to raise food, funds and awareness of hunger in Connecticut. Your contribution to this effort is GREATLY appreciated."

On February 13, 2009, Fred Gliesing, Senior Forester, NYC DEP Bureau of Water Supply, wrote the following to Dr. Jeff Ward. "Thanks for the package you sent me regarding your current barberry control work and upcoming work. Very interesting with very good info. A number of people have commented to me in the past about how your work is highly regarded because it addresses current issues that affect landowners and foresters with practical methods being tested. This work continues to support these thoughts. I have scanned the documents and have forwarded them to at least 8 people in DEP to educate them of your work and gain support for your project with Cornell. I hope the economic times don't impact your grant request. Once again, thanks."

On February 17, 2009, Donna Crymes of Chester County, PA wrote to the following to the CDC regarding the Tick Management Handbook. The e-mail was forwarded to Dr. Kirby Stafford. "I live in Franklin Township in Chester County, Pennsylvania. We are having a problem with white-tailed deer and Lyme disease. I feel this is one of the most educational handbooks out there and I would like to share this material for those who do not have access to the internet. This handbook is wonderful. I wish I had known this information before my son and I contracted Lyme disease but we are putting this information to use now. I would love to introduce my community to this wonderful resource. It truly gives you ways to prevent Lyme disease."

On February 20, 2009, Dr. Victoria Smith wrote the following to Dr. Robert Marra. "Thank you for your participation in the Forest Health Workshop yesterday. Your efforts helped to make the day informative and enjoyable, and are appreciated."

On February 26, 2009, Kathy Litchfield, NY Course Coordinator/NOFA Organic Land Care Program, wrote the following to Dr. Scott Williams. "Thanks again for traveling all the way to Schodack, NY to teach at our first-ever NY state NOFA 5-day Course in Organic Land Care! It was wonderful to meet you and have you teach Wildlife Management, and I hope you enjoyed the experience as well. Thank you also for generously donating your travel expenses back to the OLC Program. While attendance at the NY course wasn't what we hoped or planned for, our 24 students were definitely enlightened and are now highly educated in organic land care. As they

go out and spread the word about our program I'm sure future courses will fill to capacity! Without speakers like you, we wouldn't have a course – so thank you so much!"

On February 27, 2009, Sandi Wilson of Fairfield County Master Gardeners wrote the following to Dr. Robert Marra. "Thank you so much for coming down to Bethel to give the two mycology presentations to the Master Gardeners. Everyone enjoyed the programs and we all learned a lot! I know it was a lot of work preparing those presentations, and we really appreciate your time and effort. Thanks again."

In March, Dr. Gabriella Chavarria of the Natural Resources Defense Council, wrote the following to Dr. Kimberly Stoner. "Thank you so much for coming to Washington to participate in the Bees and Pesticides meeting. Great pleasure to finally meet you and look forward to many more interactions. Keep in touch."

On March 6, 2009, Tim Abbey of Penn State Cooperative Extension wrote the following to Dr. Wade Elmer. "On behalf of the Professional Pest Managers School Committee, I want to thank you for making the trip to Lancaster to present at the 2009 Professional Pest Manager's School. Your presentation was well received. My colleague Steve Bogash and I really found it interesting. It was also nice to see you and have some time to visit. If you make it down to the area when the weather is warmer, let me know."

On March 11, 2009, Kate Cecciani of the Cherry Brook Garden Club wrote the following to Ira Kettle. "On behalf of the Cherry Brook Garden Club let me say a huge thank you! Your presentation was excellent and gave all of our members the chance to learn the details of bee keeping in such an interactive way. We appreciate all that you do through your work and the CAES – Happy Spring!!"

On March 16, 2009, Kristen Dreyer, Education Conference Manager at New England Grows, wrote the following to Dr. Sharon Douglas. "On behalf of the New England Grows Board of Directors, I would like to thank you for your participation in New England Grows, which took place February 4-6, 2009 at the Boston Convention and Exhibition Center in Boston, MA. Your presentation on Combating Plant Disease in the Nursery was very informative. You are a very engaging speaker and the response from the nearly 1,000 attendees at your session was overwhelmingly positive. The 17th annual New England Grows conference was a resounding success and we are grateful that you played a part in that."

On March 20, 2009, Lynda O'Donnell, Program Chair, North Haven Garden Club sent the following note to Dr. Kimberly Stoner. "Thank you (belated) for a most informative and enjoyable program. We are using your helpful tips as we start our gardens."

On March 23, 2009, Shulman Meher e-mailed the following to Dr. Gale Ridge. "I can't thank you enough for your response and for responding so speedily – you've definitely relieved my fears!"

On March 25, 2009, Sam Pierson wrote the following to Mary Inman. "Thank you very much for the three articles about how to care for Hazelnut trees. Mine had become almost a thicket, a nice screen between two houses but much too high. This year we'll try reducing the three trees by one third, a first stage. The articles are very helpful and I thank you so very, very much for providing this information. Now if I can just figure out how to keep the squirrels from getting the nuts before I can!"

On March 25, 2009, Becky Paul wrote the following to Dr. Sharon Douglas. "I loved your presentation in Guilford last week! This was all new historical information to me – especially about tea."

In the spring, 2009, Paul Nunes wrote the following to Dr. Francis Ferrandino. "Thanks for the updates. We've been basically spraying at every possible window of opportunity, sometimes on Sunday or when the leaves are still damp. … We're spending a fortune on chemicals this year. That's why your research is so important. One round of sprays costs me about $2,100 plus fuel ($60) and labor ($650). That's about $2,800 every time we spray! If you can save me one spray during the year, that's significant. I'm also just now realizing the insignificant cost of a weather station (not that I had to pay for it) if that instrument could help me in reducing the number of times I spray. So, there is your pat on the back in case you haven't gotten one in a while. Go get em!"

In the spring, 2009, Bob Heffernan, Executive Director of the Connecticut Greenhouse Growers Association, wrote the following to Dr. Wade Elmer. "Thanks for being part of the program at Lockwood recently – good stuff on pythiom in flood floor watering. You're always so willing to help the green industry and share your expertise. We're so fortunate to have you!"

In April, 2009, Todd DuPont, Program Coordinator and David Tovar, Instructor, The Bartlett Arboretum and Gardens, wrote the following to Dr. Jeffrey Ward. "On behalf of myself, David Tovar and The Bartlett Arboretum & Gardens I would like to extend my thanks and gratitude for coming and assisting with our Spanish section of Arboriculture. I am sorry we did not get a chance to meet but I have heard great things about you. David said you helped the class with tree biology and pruning techniques. Our Arboriculture program depends on the generosity of instructors from a variety of organizations and without their help the program would not be as successful as it is. Thank you so much for donating your time and efforts to our program."

In April, 2009, Joe Maisano, Program Chairman of the Heritage Village Garden Club wrote the following to Dr. Abigail Maynard. "On behalf of the Heritage Village River Garden Club I want to personally thank you for being part of our Spring Program. Your expertise on vegetables will help our gardeners produce new and old varieties for themselves and our farmers market. …"

On April 6, 2009, Lucille Thomas of the Steering Committee for the Shoreline Institute of Lifelong Learning wrote the following to Dr. Sharon Douglas. "The members of Shoreline Institute of Lifelong Learning (SILL) would like to thank you and to let you know that we appreciate your participating in our winter program. We hope that you will be willing to share your expertise with us again at some time in the future."

On April 7, 2009, Kimberly J. Blake, Associate Professor and Chair of Life Sciences at Mitchell College, wrote the following to Dr. Sharon Douglas. "On behalf of the instructors coordinating and the students enrolled in ES 150, the Career Seminar Course at Mitchell College, I wish to extend my gratitude for your presentation to us on March 5 at the college. The students appreciate receiving information about your particular career in the environmental field and the advice about the preparation, both academic and personal, that you have offered them. The instructors are grateful for this as well and for your volunteering your time to share your insights with the class. Thank you very much and we hope to continue our relationship for future assistance as we develop our program in Environmental Studies here at Mitchell College."

On April 23, 2009, Liza B. Knapp, Professor of Biology at Eastern Connecticut State University, wrote the following to Dr. Victoria Smith. "I just wanted to thank you again for your wonderful talk last week. I appreciate your coming to share your expertise with the class. It was good to get a really detailed look at a major invasion in progress – they've been studying invasive species all term but I think your talk and pictures really made the problem real for them. …"

On April 29, 2009, Donna M. Veach, Marketing and Special Events Director for the New Britain Youth Museum wrote the following to Ira Kettle. "On behalf of the New Britain Youth Museum at Hungerford Park, I want to thank you for coming to our Earth Day Celebration with your bees and handouts. Mother Nature cooperated (usually we have monsoons when we hold outdoor events) and the event was well attended. Many commented about your hive and how they learned something new about bees. I'm hoping that you enjoyed yourself as did our patrons. I look forward to next year's Earth Day Celebration and hope you will come again."

On April 30, 2009, Representative John Stripp wrote the following to Gregory Bugbee. "Thank you for participating in the Green Solutions for Lawn and Yard Care on April 27 at the Weston Library. Your time and commitment are greatly appreciated. I was fascinated by your information and the comfortable way it was addressed with the lay audience. The attendees appreciated your presentation. I am only sorry there were not more people in attendance. Your work for the State of Connecticut is commendable. Thank you for your service and dedication to your work."

On April 30, 2009, Representative John Stripp wrote the following to Dr. Kirby Stafford. "Thank you for participating in the Green Solutions for Lawn and Yard Care on April 27 at the Weston Library. Your time and commitment are greatly appreciated. I was fascinated by your information and the comfortable way it was addressed with the lay audience. The attendees appreciated your presentation. I am only sorry there were not more people in attendance. Your work for the State of Connecticut is commendable. Thank you for your service and dedication to your work."

On May 8, 2009, John Cory wrote the following to Dr. Sharon Douglas. "My name is John Cory and I have a bad case of Artillery Fungus. While researching the subject, I called the Connecticut Agricultural Experiment Station and a person there directed me to your paper on the subject. I downloaded your paper and wanted to thank you for looking into this fungus and for

the depth of information that you have made available to the public. … Thank you again for your work on this subject."

On May 25, 2009, Erica Fern of the Connecticut Grounds Keepers Association wrote the following to Dr. Jeffrey Ward. "Thank you for speaking at the CGKA member meeting on May 4. Your presentation was very helpful to our members, control of deer is important to the Connecticut Landscape. We look forward to having you speak again and will see you at Plant Science Day."

On May 25, 2009, Erica Fern of the Connecticut Grounds Keepers Association wrote the following to Dr. Kirby Stafford. "Thank you for speaking at the CGKA member meeting on May 4. The information you shared on ticks, their control and life cycle was very helpful in assisting us in prevention of Lyme disease. We look forward to having you speak again and seeing you at Plant Science Day".

On May 27, 2009, Seth Godfrey, Business, Jobs & Nonprofit Services, the New Haven Free Public Library, wrote the following to Dr. Kirby Stafford. "I just wanted to thank you for The Connecticut Agricultural Experiment Station's Department of Entomology's help in providing educational displays for the patrons of the New Haven Free Public Library. It has been a pleasure each spring collaborating and developing something new from the entomological world with the help of Rose Bonito. Our patrons are always quite impressed by the information provided by your department in regard to research that is going on in the field of entomology and many times engage in lively discussions whether it be about Lyme disease, integrated pest management, or the menace of the Asian Longhorned Beetle. I would say our patrons have gained a deeper understanding of "bugs and insects" and a great respect for the men and women who study them. As the business librarian I would hope that some of our patrons would consider careers in the field of entomology. I look forward to further cooperation with displays and programs in the years ahead."

On May 28, 2009, Celine Finn of Whitney Center wrote the following to Dr. Sharon Douglas. "Thank you for taking the time to speak to the residents at Whitney Center on May 18th. Your presentation was informative and stimulating, and some of us would like to visit the Connecticut Agricultural Experiment Station in the near future. We appreciate all that the Station does in assisting the public with diagnosing plant health problems and again, we than you for helping us with our Monday night lecture series."

On May 28, 2009, Susan deMarais wrote the following to Dr. Botond Balogh. "I would like to offer my sincerest appreciation for your interest and willingness to partner with my son Christopher in designing and executing a 6th grade science project for Ms. Alicia Collins' science class at Saxe Middle School in New Canaan. Working with you in a plant pathology lab made him aware of the professional expertise you use every day to try and help other people solve problems involving plant disease. It also gave Christopher a very practical experience of how science offers a road to discovery, a road which requires background knowledge, careful elaboration of the experiment, and deep thought about procedural issues and results. … I am sure Christopher will feel very proud presenting his project on Friday, June 12 at the Science

Share Day for his own classmates, invited students from the high school, and parents. He will be sure to cite your collaboration and include on his poster board information on The Connecticut Agricultural Experiment Station in New Haven. Before that date, he will also send his project write-up for your observations."

On June 1, 2009, Lois Pomier wrote the following to Mary Inman. "Thank you so much for all your information. In all the years I have been growing azaleas I've never seen this fungus. I must hope it doesn't spread to all of the ones I have here. I'm now almost 93 and I'd like my garden to survive as long as I do. I also don't want to leave a bunch of diseased plants to who ever takes over my place. This past winter and spring has not been too great for plants. …"

On June 2, 2009, Rita Kornblum, Health Education Manager of the City of Hartford Health and Human Services Department, wrote the following to Thomas Rathier. Thank you so much for your quick response. I met Dr. Ridge when I attended the program that was offered in March 2009 in New Haven. She is a fabulous speaker and I am honored that she is willing to come to Hartford to be part of our effort to inform Hartford residents about bed bugs. Thank you so much for arranging this substitution. I will send directions and further details directly to Dr. Ridge."

On June 9, 2009, Kerry Landeck wrote the following to Dr. Gale Ridge. Thank you for returning my inquiry regarding the ALB. Victoria Smith had contacted me as well and with the help of photos, determined that our culprit was a white spotted sawyer. Whew! In our e-mail panic many requests for help went out (all were acknowledged!), and we celebrated with ice cream! Now we really know what to look for. Thank you again for replying and our 150 year old maple thanks you and our "sugar bowl" thanks you, too!"

On June 12, 2009, Richard A. Moccia, Mayor of Norwalk and William Brennan, First Selectman of Wilton, wrote the following to Dr. Sharon Douglas. "On behalf of the 2009 Norwalk/Wilton Tree Festival Committee, we wish to express our appreciation for your participation as an exhibitor at the Festival on Saturday, May 16th at Cranbury Park in Norwalk. The ALB exhibit was particularly valuable. The mission of the Festival is to educate residents about the vital contribution that community trees make to their health, welfare, and quality of life and provide an enjoyable, no-fee event that promotes the proper care of privately owned trees. The CAES exhibit was instrumental in accomplishing this mission and in making the Festival the great success it was, with nearly one thousand attendees. We hope you and the CAES found the event rewarding and worthwhile. … The 2010 Tree Festival will be held on May 22, 2010, again at Cranbury Park in Norwalk. We look forward to having the CAES participate as an exhibitor in the event. Once again, thank you for your part in helping make the Festival such an enjoyable and educational event. …"

On June 22, 2009, Scott Wylie of Pickwick Tree Care wrote the following to Dr. Kirby Stafford. "Many thanks for the very useful information regarding the black legged tick on Friday. Thank you for sharing this valuable knowledge and being available when I needed it."

On June 26, 2009, Michael J. Darre, Professor and Extension Poultry Specialist at UConn, wrote the following to Dr. Kirby Stafford. "Thanks again for the excellent presentation on insect identification and control at the North Atlantic Poultry Biosecurity and Pest Management Workshop. Your talk presented some good insights into their behavior and control and generated a good discussion about bed bugs!"

On June 30, 2009, Thomas Conlin wrote the following to Dr. Gale Ridge. "I was in the Station earlier today with a sample of bloodgood maple, and the question as to whether the damage was a result of disease or insects. You and the staff were extraordinarily gracious and generous with your time, and the diagnosis of physical damage. … With thanks, I will be following your recommendation of earlier today to return with additional samples of the bloodgood maple in August – just to be safe."

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

DEPARTMENT OF ANALYTICAL CHEMISTRY

WALTER J. KROL

- Secretary, New Haven Section, American Chemical Society

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

NEIL MCHALE

- Chairman, Institutional Biosafety Committee

RICHARD PETERSON

- Vice President and voting delegate, 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
- Linnaean Society of London Fellow
- Institutional Biosafety Committee
- Institutional Animal Care and Use Committee
- Station Health and Safety Committee
- Plant Science Day Committee
- Sigma Xi Membership Committee

DOUGLAS DINGMAN

- CAES Institutional Biosafety Committee
- CAES Plant Science Day committee
- Sigma Xi programs committee (Quinnipiac Chapter)
- Alternate Responsible Official for Select Agents (CAES)

DEPARTMENT OF ENTOMOLOGY

LOUIS A. MAGNARELLI

- Research Affiliate, Epidemiology and Public Health, Yale University School of Medicine
- Administrative Advisor, Multistate Research Project NE-1040 on nematodes
- Member, Legislative Invasive Plants Council
- Councilor, Connecticut Academy of Science and Engineering

CHRIS MAIER

- Curatorial Affiliate in Entomology, Peabody Museum of Natural History, Yale University
- Member, Advisory Committee, Cooperative Agricultural Pest Survey, USDA
- 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
- Research Associate, Mohonk Preserve, New Paltz, New York

KIRBY C. STAFFORD III

- Multi-State Activities Committee, Northeastern Region Association of Experiment Station Directors, member

VICTORIA SMITH

- Northeast Area Association of State Foresters Firewood Working Group; member
- USDA-APHIS-CPHST National Plant Pathogen Laboratory Accreditation Program (NPPLAP); member
- USDA National Cooperative Agricultural Pest Survey Committee; Eastern Plant Board Representative
- National Plant Board/PPQ *Phytophthora ramorum* Working Group; member
- National Ornamentals Research Site at Dominican University of California; Steering Committee member
- Eastern Plant Board; Member and Vice-President
- USDA-APHIS-PPQ Early Detection-Rapid Response Committee; member
- Northeast Sustainable Agriculture Research and Education (NE-SARE) Program; Eastern Plant Board representative to the Administrative Council
- New England Wildflower Society, Connecticut Task Force; member
- Authorized Certifying Official recertification completed

KIMBERLY STONER

- Board of Directors, Northeast Organic Farming Association of Connecticut
- Member 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
- Member, Multi-State Resarch Project NC1173 – Sustainable Solutions to Problems Affecting Bee Health
- President, Friends of Boulder Knoll

DEPARTMENT OF FORESTRY AND HORTICULTURE

JEFFREY S. WARD

- Secretary, Connecticut Tree Protection Examination Board
- Executive Board Member, Connecticut Urban Forest Council
- Research Chair, Connecticut Forestland Council
- Ex-Officio Member, Goodwin Scholarship Committee
- Reviewer: USDA Forest Service-Northern Research Station, Northern Journal of Applied Forestry, Scandinavian Journal of Forest Research, Annals of Forest Science, Forest Ecology and Management

JOSEPH P. BARSKY

- Executive Committee, New England Society of American Foresters

MARTIN P. N. GENT

- Official representative, NE1017 Regional Research Committee.
- Steering Committee, New England Vegetable & Berry Growers Conference.
- Associate editor, Journal of Plant Nutrition.
- Reviewer for six different scientific journals.

ABIGAIL A. 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

- Secretary, American Society of Enology and Viticulture – Eastern Section
- Statistics and Protocol Subcommittee, NE-1020: Multi-State Evaluation of Winegrape Cultivars and Clones
- National Risk Management (Sustainable) Guidelines Working Group, National Viticulture Extention Leadership
- CAES Representative, Connecticut Farm Wine Development Council
- CAES Representative, Connecticut State Consulting Committee for Agricultural Education

SCOTT C. WILLIAMS

- Board Member, Connecticut Urban Forest Council
- Commissioner, Town of Guilford Inland Wetlands Commission
- Commissioner, Town of Guilford Land Acquisition Commission
- Reviewer: Human-Wildlife Conflicts, Forest Ecology and Management, Natural Areas Journal

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

SANDRA L. ANAGNOSTAKIS

- Treasurer, 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

BOTOND BALOGH

- Member, Phyllosphere Microbiology Committee, American Phytopathological Society

SHARON M. DOUGLAS

- Member, APS Foundation Board, American Phytopathological Society
- Member, Local Arrangements Committee, Northeastern Division of American Phytopathological Society
- Member, USDA-APHIS-PPQ Cooperative Agricultural Pest Survey Committee (CAPS) for Connecticut
- Member, Institutional Biosafety Committee, The Connecticut Agricultural Experiment Station
- Member, Board of Directors, Connecticut Tree Protective Association
- Co-Chair, Education Committee, Connecticut Tree Protective Association

WADE H. ELMER

- Councilor, Northeastern Division of American Phytopathological Society
- Member, Nominations Committee, Northeastern Division of American Phytopathological Society
- New England Coordinator, Widely Prevalent Fungi Network
- Member, Program Committee, Connecticut Greenhouse Grower's Association
- Member, Northeast Research, Extension and Academic Program Committee

ROBERT E. MARRA

- Member, Steering Committee for *Connecticut Conference on Natural Resources*
- Chair, Local Arrangements Committee, Northeastern Division of American Phytopathological Society
- Member, Forest Pathology Committee, 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 NE-507: Mosquitoes, Disease & Public Health
- Member, Multi-State Research Project S-1024: Discovery of Entomopathogens and Their Integration and Safety in Pest Management Systems"
- Member, State of Connecticut Mosquito Management Program
- Member, Peabody Fellows Biodiversity and Human Health Program, Yale University

GREGORY J. BUGBEE

- Director, Clear Lake Improvement Association
- Editor, *Journal of Aquatic Plant Management*
- 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
- Fellow, Soil Science Society of America
- Associate Editor, *Environmental Engineering Science*
- Guest Associate Editor, *Journal of Environmental Quality*
- Member of W-82 Multi-State Project: Pesticides and Other Organics in Soil and Their Potential for Groundwater Contamination
- Immediate Past Chair, Division S-11 (Soils and Environmental Quality) Soil Science Society of America

MICHAEL THOMAS

- Member, Endangered Species Advisory Committee for Insects and Arachnids, Connecticut Department of Environmental Protection
- Member, Technical Working Group, Connecticut State Grassland Habitat Conservation Initiative, Connecticut Department of Environmental Protection

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

- Vice President, International Phytotechnology Society
- Managing Editor, International Journal of Phytoremediation.
- Member, Editorial Board, Environmental Pollution.
- Member, Editorial Board, Environmental Toxicology and Chemistry
- Member, Executive Committee, 5th International Phytotechnologies Conference
- 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.

CAROLE CHEAH

- Fellow of the Cambridge Philosophical Society, UK

RICHARD S. COWLES

- Japanese Beetle Harmonization Agreement Treatment Committee
- Treasurer, Connecticut Entomological Society

JAMES A. LAMONDIA

- Vice President, Northeast Division of American Phytopathological Society
- 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 Executive Board Member
- Society of Nematologists Extension Committee

DEWEI LI

- Board Member of the EMPAT Task Force 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.
- Weed Science Society of America – Member of Weed Alert Committee and Herbicides for Minor Uses Committee
- Northeastern Weed Science Society – Nominating 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 presented formal lectures and seminars to organized groups outside the Station. They also described their research to organized groups visiting the Station and occasionally reported on their research to elected officials. At other times newspaper, radio, and TV reporters interviewed our staff. These occasions are listed below.

AHRENS, JOHN F.

- Participated as an official advisor at a meeting of the Board of Directors of the Connecticut Christmas Tree Grower's Association *July 9, 2008*
- Along with Dr. Todd Mervosh, spoke about new herbicides for Christmas trees under investigation at the Valley Laboratory at the twilight meeting of the Connecticut Christmas Tree Growers Association (45 attendees from CT, MA, and RI) *July 10, 2008*
- Spoke on the subjects of vegetation control and fir species adaptation at a twilight meeting of the Connecticut Christmas Tree Growers' Association at the Staeley Farm in East Haddam, CT (40 attendees) *June 17, 2009*
- Spoke to members of the New Hampshire/Vermont Christmas Tree Association on vegetation control in Christmas trees at their annual summer meeting at the Russell Reay Farm in Cuttingsville, VT (75 attendees) *June 20*

ANAGNOSTAKIS, SANDRA L.

- Met with colleagues from the University of Norte Dame (IN), University of Tennessee-Knoxville, and Frostburg University (MD) to discuss plans to integrate forest science into the new school program and to examine butternut trees and hybrids on the Qualla Boundary Cherokee Reservation in North Carolina *July 10-13, 2008*
- Met with two students and the laboratory manager of the molecular genetics laboratory at the University of Notre Dame to show them butternut and hybrid populations found in Connecticut *July 18-20*
- Presented a "recreation" of a talk (done in period costume as Flora Patterson, USDA) on chestnut blight given by two USDA scientists at the first meeting in 1908 at the Centennial meeting of the American Phytopathological Society in Minneapolis, MN (500 attendees) *July 28*
- Traveled to Long Island to visit the Greentree Foundation, which is a large, forested estate in the center of the island where the United Nations holds their smaller meetings. They have asked for a planting of CAES timber chestnuts and one with representatives of all six chestnut species for a small arboretum *August 20*
- Spoke about her chestnut research and the Cheshire chestnut to members of the Cheshire Congregational Church at their annual Welcome Sunday in Cheshire (175 adult and 175 youth attendees) *September 7*
- Reported on Experiment Station 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 Frankfort, MI (40 adult attendees) October
- Spoke about butternuts to a botany class from Quinnipiac University in Jenkins (1 professor and 13 student attendees) *November 10*
- Reported on searching for oak wilt at the Cooperative Agricultural Pest Survey (CAPS) meeting in Windsor (15 attendees) *November 13*

- Spoke about the Department of Plant Pathology and Ecology to a group of high school students from the Education Connection (10 adult and 40 youth attendees) *December 15*
- Spoke about chestnut trees to a group of fourth-grade students in the talented and gifted program in New Haven at the Station (2 adult and 4 student attendees) *January 22, 2009*
- Gave a talk entitled "Chestnut, butternut, oaks – All that tree stuff" at the forest Health Monitoring workshop in Jones Auditorium (35 attendees) *February 19*
- Spoke to officials from the DEP and BWMA, as well as members of the public about the planned harvest of 2 acres of timber and chestnut tree plantings at Belding Wildlife Management Area in Vernon (40 attendees) *March 17*
- Met with the New Haven Garden Club to discuss a project on "Elms for the Elm City" in Jenkins (10 participants) *April 6*
- Presented a paper entitled "Connecticut Chestnut Trees" at the annual meeting of the Chestnut Growers of America in Carrollton, OH (40 attendes) *June 26-28*

ANDREADIS, THEODORE G.

- Presented a lecture entitled "West Nile virus: an exotic emerging mosquito-borne disease in the western hemisphere" to a group of secondary school teachers from Connecticut as part of the "Peabody Fellows Program on Biodiversity and Vector-Borne Diseases (30 attendees) *July 15, 2008*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Stamford by Fran Schneido, CBS Radio, NY *July 15*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Stamford by Stephen Clark of the Stamford Advocate *July 15*
- Was interviewed about the first human case of West Nile virus this year in a resident of Sherman, CT by Fran Schneido, CBS Radio *July 15*
- Was interviewed about the first human case of West Nile virus this year in a resident of Sherman, CT by Bob Miller of the Danbury News Times *July 15*
- Was interviewed about the first human case of West Nile virus this year in a resident of Sherman, CT by Marc Sims of Connecticut Public Radio *July 15*
- Presented an overview of West Nile virus and the Mosquito Trapping and Testing Program to a group of approximately 24 TAG students from the greater New Haven area *July 18*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Stamford and the first human case of West Nile virus this year in a resident of Sherman by Chase Wright of the Stamford Times *July 22*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Stamford and the first human case of West Nile virus this year in a resident of Sherman by Meredith Blake of the Greenwich times *July 22*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Milford and overall West Nile virus activity in Connecticut by Pam McGloughlin of the New Haven Register *July 23*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Milford and overall West Nile virus activity in Connecticut by Noelle Frampton of the Connecticut Post *July 23*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Milford and overall West Nile virus activity in Connecticut by Sara Wilson of the Bristol Free Press *July 23*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Greenwich by Meridith Blake of the Greenwich Times *July 24*

- Was interviewed about the early West Nile virus activity in Connecticut this year by Marc Sims of Connecticut Radio Network *July 24*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Darien, East Haven, Hamden, New Haven, and Norwalk by Anjuli Porter of NBC 30TV *July 29*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Darien, East Haven, Hamden, New Haven, and Norwalk by Fran Schneido of CBS Radio NY *July 29*
- Was interviewed about the isolations of West Nile virus from mosquitoes collected in Darien, East Haven, Hamden, New Haven, and Norwalk by Elizabeth Benton of the New Haven Register *July 29*
- Was interviewed about mosquitoes and West Nile virus by Kevin Jacobson of News 12 Connecticut *August 8*
- Was interviewed about West Nile virus activity in the town of Stamford by Meredith Blake, Greenwich Times *August 8*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in New Canaan by the New Canaan News Review *August 12*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in New Canaan by Bob Miller of the News Times *August 12*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in New Canaan by Steve Kobak of The Hour, Norwalk *August 12*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in New Canaan, Shelton, Westport and Wilton by Bob Miller of the Danbury News Times *August 13*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in New Canaan, Shelton, Westport and Wilton by Steve Kobak of The Norwalk Hour *August 13*
- Was interviewed about the current status of West Nile virus in the State of Connecticut by Steve Kotchko of Connecticut Radio Network *August 14*
- Was interviewed about West Nile virus activity in the Town of Greenwich by Meredith Blake of the Greenwich Times *August 14*
- Was interviewed about the abundance of mosquitoes this summer and the impact on West Nile virus activity by Steve Grant of the Hartford Courant *August 25*
- Was interviewed about the human case of West Nile virus in a resident of Bridgeport by Fran Schneido of CBS Radio, New York *August 26*
- Presented an overview of the Station's research and surveillance program on mosquitoes and West Nile virus to Dr. Gregory Weideman, Dean and Director of the College of Agriculture, UConn *August 28*
- Was interviewed about the human case of West Nile virus in a elderly resident of Stamford by Martin Cassidy of the Stamford Advocate *September 18*
- Was interviewed about the 2008 mosquito and West Nile virus season in Connecticut for 2008 by Steve Kotchko, CT Radio Network *October 2*
- Was interviewed about the 2008 West Nile virus season in Connecticut and the northeastern US by Marc Sims of CT Public Radio *November 7*
- Presented an overview of the State Mosquito and Arbovirus Surveillance Program to State Senator Edward Meyer *November 14*
- Gave a lecture about mosquitoes and West Nile virus to students from St. Ann School in Bridgeport and provided a tour of the Biosafety Level 3 and Electron Microscope Laboratories as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (18 student participants) *November 20*

- Gave an oral presentation on West Nile virus and a tour of the Biosafety Level 3 and Electron Microscopy Laboratories to a group of students from Career High School in New Haven as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (28 students) *December 3*
- Presented an invited talk "Failure of the Asian tiger mosquito, *Aedes albopictus* to overwinter following introduction and seasonal establishment at a tire recycling plant in Connecticut" at the Annual Meeting of the Northeastern Mosquito Control Association, Providence, RI (100 attendees) *December 8*
- Gave an oral presentation on West Nile virus and a tour of the Biosafety Level 3 and Electron Microscope Laboratories to a group of students from Career High School in New Haven as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (25 students) *December 18*
- Presented an overview of the Research and Surveillance Programs on Mosquitoes and Mosquito-borne Diseases at the Station to officials of the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene *February 6, 2009*
- Presented a summary of current research activities and accomplishments on mosquitoes and mosquito-borne diseases at the annual meeting of Multi-State Project NE-507, Biology, Ecology & Management of Emerging Disease Vectors, held at Rutgers University, New Brunswick, NJ (12 attendees) *February 10-11*
- Moderated a session on Surveillance and Control at the International Symposium on the Asian Tiger Mosquito: Ecology, Evolution, Epidemiology, and Control held at Rutgers University, New Brunswick, NJ (200 attendees) *February 12-13*
- Participated in the 2009 West Nile Virus Conference sponsored by the Centers for Disease Control and Prevention and the American Mosquito Control Association, held in Savannah, GA (300 attendees) *February 19-20*
- Presented an overview of The Mosquito Trapping and Testing Program for Mosquitoes and West Nile Virus to a group of Future Farmers of America teachers visiting the Station (11 attendees) *February 27*
- Presented the lecture "West Nile virus: a ten-year perspective on what we have learned and what we can expect in the future" at a meeting of the Experiment Station Associates held at the Station (45 attendees) *March 30*
- Gave a presentation on West Nile Virus and a tour of the Biosafety Level 3 and electron microscope laboratories to a group of 26 students from the Metropolitan Business Academy in New Haven as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University *March 31*
- Gave an oral presentation on West Nile virus and a tour of the Biosafety Level 3 and electron microscope laboratories to a group of 14 students from the Walsh Intermediate School in Branford as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University *April 16*
- Presented a talk entitled "West Nile Virus: An Exotic, Emerging Mosquito-Borne Disease in the Western Hemisphere" to a class of students enrolled in a course in Medical Entomology at the University of Connecticut, Storrs (20 participants) *April 12*
- Attended an Advisory Council meeting of the Peabody Fellows Biodiversity and Human Health Program held at Yale University (9 attendees) *April 28*
- Presented a lecture entitled "West Nile virus: a ten year perspective on what we have learned and what we can expect in the future" at a Mosquito and Biting Fly Pesticide Applicator Workshop sponsored by Clarke Mosquito Control, East Hartford (25 attendees) *April 29*
- Was interviewed about mosquitoes, West Nile virus, and the upcoming season by Sam Gingerella for a Sunday morning program on WTIC radio *May 7*
- Was interviewed about crane flies and ineffectiveness of electronic bug zappers for controlling mosquitoes by Harlan Levy of the Manchester Journal Inquirer *May 13*

- Was interviewed about mosquitoes, West Nile virus and the mosquito trapping and testing program by Matthew Engelhardt of the Mancheser Journal Inquirer *May 20*
- Was interviewed about the start of the State Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis viruses by Fran Schneido CBS Radio NY *June 1*
- Was interviewed about the start of the State Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis viruses by Marc Sims of Connecticut Radio Network *June 1*
- Was interviewed about the State Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis viruses and the outlook for 2009 by Blaise Gomez of Cablevision 12 Norwalk *June 2*
- Was interviewed about the Experiment Station's Mosquito and Arbovirus Surveillance and Research Programs by Marc Sims of Connecticut Radio Network *June 4*
- Participated in a State Public Health Vector Control Conference on current issues concerning mosquitoes, ticks, arbovirus surveillance, and bed bugs *June 4*
- Was interviewed about the potential impact of the decline in bats due to the "white-nose fungus" on mosquito populations and West Nile virus by Libby Sile of the Hartford Courant *June 15*
- Was interviewed about the impact of the excessive amount of rainfall in June on mosquito populations and West Nile virus by Fran Schneido of CBS Radio, New York *June 22*
- Was interviewed about the impact of the excessive amount of rainfall in June on mosquito populations and West Nile virus by Dana Waylon of WTIC Radio *June 23*
- Was interviewed about pesticide resistance in mosquitoes by Elie Dolgin, Associate Editor of The Scientist magazine *June 23*
- Was interviewed about the Experiment Station's Mosquito and Arbovirus Surveillance and Research Programs by Lauri Sanders, National Public Radio *June 24*
- Was interviewed about the Mosquito Trapping and Testing Program for West Nile and Eastern Equine Encephalitis viruses by Mari Ann Gail Brown of The Connectiuct Post *June 30*

ARMSTRONG, PHILIP M.

- Spoke to students from the Yale Summer Scholars Program on the West Nile Virus Surveillance Program *July 11, 2008*
- Gave a tour of the Bio-safety Level 3 Laboratory and described protocols for arbovirus isolation and identification to officials of the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene *February 6, 2009*
- Served as a judge at the New Haven Science Fair *May 12-13*

ARSENAULT, TERRI

- Participated in an EPA Regional Laboratory meeting in Concord, NH *November 6, 2008*
- Participated in the national meeting of the FDA Food Emergency Response Network (FERN) in Dallas, TX *June 16-19, 2009*

AYLOR, DONALD E.

- Gave an invited talk entitled "Prospects for using precision agriculture for an aerially dispersed pathogen in a patchy environment" at the 9th International Congress of Plant Pathology in Torino, Italy (115 attendees) *August 28, 2008*
- Gave a talk entitled "Quantifying aerial dispersal of maize pollen" in the Department of Agronomy at Iowa State University in Ames, IA (10 attendees) *February 26, 2009*

- Discussed plant disease epidemiology with professors and graduate students in the Department of Plant Pathology at Iowa State University in Ames, IA *February 26*
- Participated in a Ph.D. prospectus examination of Brian Viner on meteorological modeling of pollen transport in the Agronomy Department at Iowa State University in Ames, IA *February 27*
- Gave an invited talk entitled "Modeling disease spread by aerially dispersed pathogens in a patchy landscape" at the Workshop on "Models and Methodological Problems of Botanical Epidemiology" held at the Center for Discrete Mathematics and Theoretical Computer Science at the Rutgers University CoRE campus located in Piscataway, NJ (20 attendees) *March 17*
- Chaired a session on "Spatially-explicit models for the spread of disease" and led a discussion on future strategies for modeling botanical epidemics at the Workshop on "Models and Methodological Problems of Botanical Epidemiology" held at the Center for Discrete Mathematics and Theoretical Computer Science at the Rutgers University CoRE campus located in Piscataway, NJ (20 attendees) *March 18*
- Gave a talk entitled "Aerial transmission of plant disease" in a graduate level class on "Climate and Life" in the Yale School of Forestry and Environmental Studies in New Haven (26 attendees) *March 31*
- Gave a series of invited lectures on "Aerobiology of plant pathogens" to graduate students and faculty from Denmark, Finland, Norway, and Sweden, as part of the annual Nordic Course in Plant Pathology, hosted by Uppsala University, in Alvkarleo, Sweden (31 attendees) *May 22-29*
- Gave the talk "Modeling disease spread across multiple spatial and temporal scales" at the 10th International Epidemiology Workshop (IEW10) in Geneva, NY (65 attendees) *June 9*

BALFOUR, MARTHA

- Gave 10 invasive aquatic plant workshops to a total of 150 seventh grade students at Canton Middle School as part of the "Discovery at Mills Pond" program (150 student attendees) *May 15*

BALOGH, BOTOND

- Attended the Connecticut Christmas Tree Growers Association Twilight Meeting at the Valley Laboratory in Windsor *July 10, 2008*
- Attended the annual summer meeting of the Connecticut Tree Protective Association in Farmington *July 17*
- Discussed repeating spruce needle rust and Rhabdocline needlecast of Douglas Fir at the Connecticut Christmas Tree Growers Association Twilight Meeting at Leavenworth Tree Farm in Cheshire (40 attendees) *August 7*
- Toured Woodland Farm in South Glastonbury, Norton Brothers Fruit Farm in Cheshire, Hickory Hill Orchard in Cheshire, Holmberg Orchard in Gales Ferry, Maple Lane Farm in Preston, and West Green Farm in Lebanon with Lorraine Los, Fruit Crops Integrated Pest Management Coordinator at the University of Connecticut, and Erica Teveris, UCONN IPM Intern, to identify ongoing disease problems and discuss management strategies *August 12-13*
- Gave a talk entitled "Common disease problems in 2008" at the Annual Nursery and Landscape Research Tour held at the Valley Laboratory in Windsor (51 adult attendees) *September 16*
- Discussed disease management strategies for Christmas tree plantations at the Annual Fall Field Day of the Connecticut Christmas Tree Growers Association at Geer Tree Farm in Griswold (80 adult attendees) *October 4*
- Gave a talk entitled "Selecting bacteriophages for biological control" at the 2nd International symposium on Biological Control of Bacterial Plant Diseases in Orlando, FL (70 attendees) *November 4-7*

- Gave a talk entitled “Peach bacterial spot update” at the Annual Meeting of the Connecticut Pomological Society in Glastonbury (70 attendees) *December 2*
- Participated in the CNLA/CGGA Winter Symposium and Expo in Wallingford *January 14, 2009*
- Participated in the CTPA Winter meeting in Plantsville *January 15*
- Participated in the Connecticut Vegetable and Small Fruit Growers’ Conference in Vernon *January 22*
- Was interviewed by the Northeast Sustainable Agriculture Research and Education (SARE) competitive grants program regarding their joint 2009 Research and Education competitive grant proposal entitled “Development and on-farm training of biologically based methods for integrated crop management of stone fruits in New England” in Manchester, NH *January 29*
- Gave a talk entitled “Update on emerging diseases and new fungicides for spring crops” at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Vernon (24 attendees) *February 10*
- Gave a talk entitled “Common tree diseases of 2008” at the Forest Health Monitoring Workshop in Jones Auditorium (35 attendees) *February 19*
- Gave a talk entitled “Update on emerging diseases and new fungicides for spring crops” at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Jones Auditorium (26 attendees) *February 20*
- Gave a talk entitled “Bacteriophage-based biocontrol of tomato bacterial spot” at the University of Massachusetts in Amherst, MA (20 attendees) *February 24*
- Gave a talk entitled “Update on emerging diseases and new fungicides for spring crops” at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Torrington (25 attendees) *February 25*
- Participated in the Perennial Plant Conference at UConn in Storrs *March 12*
- Participated in the NEPDN 2009 Annual Regional Meeting in New Brunswick, NJ *March 17-19*
- Spoke about tree diseases at the Tree Condition Lab of the CTPA Arboriculture 101 class (30 attendees) *March 26*
- Participated in a Twilight Meeting of the Connecticut Pomological Society at Silverman’s Farm in Easton *April 28*

BARSKY, JOSEPH P.

- Gave a brief report of current forestry research while additionally serving as Connecticut representative to the New England Society of American Foresters Executive Committee Meeting in Warren, NH *September 19, 2008*
- Gave a presentation on forest measurements to high-school students at an Envirothon Forestry Training Workshop at the Tolland County Agricultural Center in Vernon (120 student attendees) *October 18*
- Participated in a meeting of the Connecticut Chapter of the Society of American Foresters Executive Committee at Yale University *November 19*
- Attended the Fourth Annual Connecticut Forest Conservation and Research Forum at the University of Connecticut *November 25*
- Gave an update on current forest research at the New England Society of American Foresters Executive Committee Meeting in East Concord, NH *December 10*
- Gave a report on current forestry research while serving as the Connecticut Representative to the New England Society of American Foresters at their Executive Committee meeting in Concord, NH *January 21, 2009*
- With Scott Williams, met with officials from the Greenwich Council of the Boy Scouts of America about white-tailed deer research and future educational outreach opportunities *February 13*

- Provided an update on current forest research at the New England Society of American Foresters Executive Committee Meeting in Portland, ME *March 17*
- Presented a poster "Reconstruction of long-term forest research data: The Old Series" that was selected as Outstanding Poster at the 89th Annual Meeting of the New England Society of American Foresters in Portland, ME *March 18-20*
- Spoke on "Career Opportunities in Natural Resources" to students at the New Haven Public School System – 8th Grade Career Fair, at Southern Connecticut State University (80 attendees) *March 26-27*
- Gave six talks on "How trees grow" at the Southington School Nature Day in Southington (120 students, 20 adults) *June 4*

BERGER, WILLIAM

- Participated in the FDA FERN National Meeting in Denver, CO *July 29-31, 2008*

BLEVINS, TIA

- Participated in the Winter Symposium and Expo of the Connecticut Nursery and Landscape Association and the Connecticut Greenhouse Growers Association at Mountainridge, Wallingford *January 15, 2009*
- Participated in the 84th Annual Meeting of the Eastern Plant Board held in Portland, Maine *April 6-9*
- Participated in a teleconference with the Executive Committee of the Horticultural Inspection Society, Eastern Chapter, to plan for the 2010 Annual Meeting *June 19*

BOMBA-LEWANDOSKI, VICKIE

- Participated in a meeting of the Connecticut Farm Bureau *August 26, 2008*
- Participated in a meeting of the Farm-City Committee in Wallingford *September 16*
- Made the arrangements for, set up the Station's display, and worked in the booth at the Big E in Springfield, MA *September 24*
- Participated in Farm-City Week at Greenbackers Farm in Durham *October 15*
- Served as a reader for grants through the CT Department of Agriculture *December 15*
- Acted as a tour guide for a tour given for the Education Connection *December 15*
- Set up Station display for the CT Flower and Garden Show at the CT Convention Center *February 18, 2009*
- Made arrangements for and set up the Station's booth at the CT Flower and Garden Show at the CT Convention Center for February 19-22 *February 19*
- Made the arrangements for and set up the Station's booth at Ag Day at the Capitol in Hartford *March 18*
- Made the arrangements for the Station's booth at The Garden Expo 2009 held at Ludlowe High School in Fairfield *March 21-22*
- Participated in a Farm-City Committee Meting at the USDA Office in Wallingford *April 2*
- Helped make the arrangements and participated in the CAES Spring Open House in Jones Auditorium *April 23*
- Represented the Station and participated in "Girls Go Green! STEM (Science, Technology, Engineering and Math) Expo at Gateway Community College, North Haven *May 1*
- Helped plan the ISIS visit/tour of CAES in New Haven for students at Southern Connecticut State University *June 30*

BONITO, ROSE

- Prepared and set up a display on "Pollinators in the Garden" at the New Haven Main Public Library, New Haven. The display focused on honey bees and butterflies seen in Connecticut to go along with the summer reading program for children *July 1, 2008*
- Set up and staffed an exhibit for the Station on tick/Lyme disease, Asian Longhorned Beetles, and Invasive Aquatic Plants at the '7th Annual Celebrating Agriculture' at the Woodstock Fairgrounds (600 visitors) *September 20*
- Arranged a display and assisted at the Station's exhibit at the Big E *September 24*
- Helped set up and staff an exhibit and answered questions on the Asian Longhorned Beetle and Honey Bees at the 27th Annual CT Flower and Garden Show held at the CT Convention Center in Hartford (20,000 visitors to the show) *February 19-22*
- Arranged an exhibit and worked at the Station's display for the 11th Annual Garden Expo held in Fairfield (2,000 attendees) *March 21-22*
- Presented a display on ticks and Lyme disease at the Biodiversity Day event, "Backyard Bloodsuckers: Biodiversity Bites Back!" held at the Peabody Museum of Natural History, Yale University, New Haven (678 attendees) *April 17*
- Arranged and set up an educational display for the month of May for the patrons of the New Haven Free Public Library *May 1*
- Arranged and set up an educational display for the month of June for the patrons of the New Haven Free Public Library *June 1*

BUGBEE, GREGORY J.

- Spoke on "Container Gardening Indoors and Out" as part of a gardening lecture series at the Manross Library in Forestville *July 9, 2008*
- Spoke on "Container Gardening Indoors and Out" to the Plymouth Garden Club at the Plymouth Town Hall *July 15*
- Spoke on "Milfoil Control in Bashan Lake" at the annual meeting of the Bashan Lake Association in East Haddam *July 19*
- Spoke on "Composting" as part of a gardening lecture series at the Burlington Public Library *July 30*
- Was interviewed about Milfoil in Lake Candlewood by Bob Miller of the Danbury News Times *July 30*
- Was interviewed by Jillian Moro of WLAD FM on invasive aquatic plants in Connecticut *August 8*
- Staffed a soil testing booth at the Waterbury Farmers Market *August 2*
- Spoke on Environmentally Sound Gardening to the Greens Farms Garden Club in Fairfield *September 9*
- Represented the Station at a meeting concerning winter drawdown in Bashan Lake at the Legislative Office Building in Hartford *September 23*
- Presented a talk entitled "Control of Eurasian Watermilfoil" at a nuisance aquatic plant symposium sponsored by he town of Newtown (40 attendees) *October 9*
- Gave two presentations on Soil Testing to 7th and 8th grade classes at the Highville Charter School in Hamden (40 attendees) *October 14*
- Presented an invited seminar entitled "Connecticut's Invasive Aquatic Plant Problem" at the Albert Notation memorial Seminar Series held at Quinnipiac University in Hamden *November 13*
- Was interviewed by Bob Miller of the Danbury News Times on "Using winter drawdown to control Eurasian water milfoil in Candlewood Lake" *January 15, 2009*

- Spoke on Connecticut's Invasive Aquatic Plants – Why They are Where They Are" and administered the aquatic pesticide supervisor recertification program at the 10th annual Northeast Aquatic Plant Management Society meeting in Saratoga Springs, NY *January 21*
- Spoke on "Soil Fertility as it Pertains to Turf" at the Connecticut Turf and Landscape Conference in Hartford *January 29*
- Presented a seminar on soils to candidates training for the Connecticut Supervisory Arborist License at the Bartlett Arboretum in Stamford (25 attendees) *February 5*
- Presented two Invasive Aquatic Plant identification Workshops at the 2009 Connecticut Envirothon held at Sacred Heart University in Fairfield (95 attendees) *February 7*
- Presented a talk "CAES Update on Invasive Aquatic Plants at the 12th Annual Meeting of the Connecticut Association of Wetland Scientists at Mountain Ridge in Wallingford (100 attendees) *February 26*
- Presented an overview of Connecticut's Invasive Aquatic Plant Problem to a group of Future Farmers of America teachers at the Station (11 attendees) *February 27*
- Hosted an "Invasive Plant Workshop for Government Officials" in Jones Auditorium and spoke on Identification of Connecticut's Invasive Aquatic Plants (58 attendees) *March 5*
- Spoke on "Using Geographic Information Systems (GIS) to Map Invasive Aquatic Plants" at the 3rd Annual Connecticut Conference on Natural Resources" held at the University of Connecticut (50 attendees) *March 9*
- Spoke on Correlating Connecticut's Invasive Aquatic Plants with Hydrography, Water Chemistry and Boat Launches at the New England Association of Environmental Biologists Conference in Westbrook, CT (35 attendees) *March 19*
- Presented the results of the 2008 CAS IAPP Invasive Aquatic Plant Survey of Lakes Candlewood and Zoar to the FirstLight Hydro Generating Company – Invasive Aquatic Plant Technical Committee in Sherman, CT (6 attendees) *March 25*
- With Martha Balfour, sponsored two events on soil testing as part of the Connecticut Science Olympiad at UCONN in Storrs (35 participants) *April 4*
- Was interviewed about ponds by Pamela Weil for the Connecticut Gardener Magazine *April 13*
- Presented two talks on Soil Testing and Invasive Aquatic Plants at Soil Testing Day in Sherman, CT (25 participants) *April 18*
- Spoke on "Green Solutions for a Greener Lawn" as part of a "Landscape Safe Program" sponsored by State Representative John Stripp held at the Weston Public Library (15 participants) *April 27*
- Spoke on soil testing as part of the Earth Day events held at the Sikorsky Aircraft Heavy Lift Division in Stratford (20 participants) *April 29*
- Instructed students on the identification and surveying of invasive aquatic plants as part of the Candlewood Lake Environmental Awareness and Responsibility Program. He was assisted by Martha Balfour and Rachel Soufrine, (20 atttendees*) June 24-25*

CHEAH, CAROLE A.

- Gave two presentations on progress in biological control of hemlock woolly adelgid at the CTPA Summer Meeting, Farmington *July 17, 2008*
- Met with USDA Forest Service scientists at the Northern Research Station, Hamden, to discuss and set up cooperative insect artificial diet experiments *July 30*
- Gave two presentations on progress in biological control of hemlock woolly adelgid at Plant Science Day 2008 for the pesticide credit tour (40 attendees) *August 6*

- Met with the forester mangers at Great Mountain Forest, Norfolk, CT to give an update on hemlock conditions and to survey for HWA *August 26*
- Met with students and instructors from the Yale Forestry School at Great Mountain Forest (35 attendees) *August 29*
- Together with Dr. Todd Mervosh, met Peter Picone from DEP Wildlife and Laurie Lindquist of DEP State Parks, to examine recent discoveries of the invasive weed, Mile-A-Minute, in North Haven *September 2*
- Participated in the Great Mountain Forest, Corp. Open Forest Day, Norfolk *September 28*
- Gave a presentation on artificial diet supplements for HWA predators at the 2009 HWA Biological Control Committee Meeting in Annapolis, MD *January 13, 2009*
- With Dr. Todd Mervosh and a representative from UCONN met with DEP and Spectra Energy officials at Quinnipiac River State Park to discuss biological control of Mile-a-Minute Vine *May 23*
- Participated in the 2009 CT Conference on Mile-A-Minute Vine at Windsor, CT *May 24*
- Gave an update on CT's biological control program for mile-a-minute vine at a CAPS meeting at the Valley Laboratory *June 2*
- Was interviewed about biological control of mile-a-minute vine in Connecticut by Penny Overton of the Republican American *June 12*
- With Dr. Todd Mervosh, met with an official from Newtown to discuss further surveys of mile-a-minute vine infestations *June 18*

COWLES, RICHARD S.

- Presented the talk "Armored scales, aphids and mites" for the CT Christmas Tree Growers' Association held at the Valley Laboratory (40 attendees) *July 10, 2008*
- Gave the talk "Chemical control of hemlock woolly adelgid at the Connecticut Tree Protective Association summer meeting in Farmington (200 attendees) *July 17*
- Gave the talk "Management of armored scales and spider mites" to the CT Christmas Tree Growers' Association, South Glastonbury (40 attendees) *July 17*
- Presented the talk "Subleties of chemical control of hemlock woolly adelgid" for the walking tour at Plant Science Day 2008, Hamden (20 attendees) *August 6*
- Presented the talk "Management of Christmas tree insect pests" for the National Christmas Tree Association, Des Moines, IA (talk was presented twice) (120 attendees) *August 14*
- Presented "Turf insect pest management" to the Athletic Turf Management Course at UConn (8 attendees) *September 11*
- Presented the talk "Elongate hemlock scale predators and chemical control" for the Valley Laboratory Nursery Field Day (40 attendees) *September 16*
- Presented the talk "Systematic insecticides to control hemlock woolly adelgids" for a meeting sponsored by Native Tree Society and Valent Corporation in Asheville, NC (85 attendees) *September 18*
- Presented the talk "Christmas tree insect management" to the Connecticut Christmas Tree Growers' Association, Jewett City (60 attendees) *October 4*
- Discussed research programs with three visiting Chinese dignitaries *October 9*
- Discussed strawberry breeding for tolerance to soil-dwelling pests with a representative from the CT Department of Agriculture, New Haven *October 16*
- Met with officials from Horiba Company and discussed the use of ELISA technology in forestry research *November 4*

- Presented the talk “Organic land care: the white grub challenge” to the Connecticut Environmental Council annual meeting, (150 attendees), Southington *November 25*
- Was interviewed for an article to be published in Arbor Age on management of hemlock woolly adelgid by Emily Dahlbeck December 18
- Gave the talk “Activity and persistence of systemics for managing hemlock woolly adelgids” at the USDA Research Forum on Invasive Species, Annapolis, MD (200 attendees) *January 13, 2009*
- Participated in an ad hoc committee meeting organized by Brad Robinson of DEP, to develop compromise legislation that could permit the use of low-toxicity pesticides on school grounds (15 attendees) *February 10*
- Spoke about “White grubs and their management” at the annual meeting of the Connecticut Forest and Parks Association held in New Haven (20 attendees) *February 11*
- Presented the talk “Activity and persistence of systemics for managing hemlock woolly adelgids” at the Connecticut Forest Health Workshop, New Haven (25 attendees) *February 19*
- Spoke about “White grubs and their management” and “Managing hemlock woolly adelgids and scales” to employees of SavALawn and SavATree at their annual training meeting in Southbury (60 attendees) *March 5*
- Gave the talk “Management of pyrethroid-resistant annual bluegrass weevils” at the Eastern Branch Meeting of the Entomological Society of America, Harrisburg, PA (25 attendees) *March 21*
- Chaired the meeting for the Northeast Regional Hatch Turf Workshop NE-1025 at the Valley Laboratory and presented the talk “Management of pyrethroid-resistant annual bluegrass weevils” (15 attendees) *March 26*
- Presented the talk “Systemics for suckers” for a Connecticut Tree Protective Association educational workshop, Hartford (60 attendees) *April 16*
- Participated in a teleconference with other research entomologists and EPA regulators in Washington, D.C. regarding the Section 3 registration of Safari for protecting ash trees from emerald ash borer. This led to immediate approval of this label *May 6*
- Gave the talk “Managing armored scales” for a Rhode Island Christmas Tree Growers’ meeting in Hope, RI (30 attendes) *May 16*
- Gave the talk “Managing armored scales” for a Connecticut Christmas Tree Growers’ meeting in East Haddem (30 attendees) *June 17*
- Gave the talk “Questions about Safari” as an invited contributor to the Valent ornamentals workshop in Banff, Alberta, Canada (25 attendees) *June 23*

DINGMAN, DOUGLAS W.

- Participated in a group interview on the Len & Lisa show “Garden Talk” at WTIC Radio 1080 *August 2*
- Conducted a job shadow for Katie Martin from Woodbury High School in Woodbury *August 11*
- Participated in an informal conference with the President of the Backyard Beekeepers Association and Dr. Kimberly Stoner regarding his research on American foulbrood and other honey bee research being conducted at CAES *October 2, 2008*
- Discussed testing of a sanitizing agent for toxicity to honey bees with the Market Segment Manager and the President/CEO of Biosafe Systems LLC *October 30*
- Participated in a Farmer’s Market listening session sponsored by CT NOFA and the CT Farm Bureau held in the CT Farm Bureau conference room, Windsor *November 14*
- Met with the Membership Chair and Farmer’s Market Oversight Committee *November 21*

- Participated in the Farmer's Market meeting held in the conference room of the Connecticut Farm Bureau, Windsor *December 10*
- Participated in the Program Planning Committee meeting for the Quinnipiac Chapter of Sigma Xi, Hamden, *December 15*
- Presented a seminar "Bees with Disease" at the Station in New Haven *January 13, 2009*
- Participated in the 2009 New England Grows Conference in Boston, MA *February 4*
- Participated in a telephone conversation with Dr. Tom Cronin on bee activity and AFB levels in his hives *February 11*
- Participated in the CT Beekeepers Association quarterly meeting (Bee School), New Haven *February 14*
- Presented a seminar "Honey bee health and American foulbrood" to students and faculty at Albertus Magnus College, New Haven *February 20*
- Consulted with Dr. Sudhir Kumar Rai of the Department of Molecular Biology and Biotechnology, Tezpur University, Assam, India, on the use of PCR primers for fingerprinting of bacteria for identification *March 10*
- Presented a seminar entitled "Honeybee Health and American Foulbrood" as part of the Albert Notation Memorial Series seminar for the Quinnipiac Sigma Xi Chapter (Quinnipiac University, Hamden *March 25*
- Participated in the Career Fair for Eighth graders of New Haven public schools (Southern Connecticut State University, Hamden *March 27*
- Presented the seminar "Honey bee health and American foulbrood" at the Connecticut Beekeepers Association in Hamden *April 4*
- Gave a talk on honey bees and American foulbrood research to AP biology students at Hamden High School, Hamden *April 20*
- Gave a demonstration on honey bees and American foulbrood research activities for the"Gardening in Connecticut" program of The Connecticut Agricultural Experiment Station's annual Open House *April 23*
- With Dr. Neil Schultes and Vickie Bomba-Lewandoski conducted a hands-on workshop "FSI:DNA Fingerprinting" with twenty-eight greater New Haven area seventh grade students as part of a day-long "Girls Go Green: Science, Technology, Engineering and Math" program co-sponsored by Gateway Community College, the Connecticut Community College System, and Connecticut Women's Education and Legal Fund *May 1*
- Participated in a meeting for the Program Arrangement Committee of the Quinnipiac Chapter of Sigma Xi, Hamden *May 14*
- Demonstrated honey bees in the CAES booth at the Norwalk-Wilton Tree Festival, Norwalk *May 16*
- Gave a presentation on honey bee research to residents at the Whitney Senior Center in Hamden *May 18*
- Participated in the Connecticut Beekeepers Association quarterly meeting at Lockwood Farm, Hamden *June 13*
- Participated in a telephone discussion on food safety issues at local farmers markets *June 18*
- Hosted a visit by Southern Connecticut State University students of Dr. Gerry Frumento's class. A talk on honey bees and American foulbrood was presented, as well as a tour of the facilities in the Department of Biochemistry and Genetics and a description of research activities *June 30*

DOUGLAS, SHARON M.

- Was interviewed about plant pathology, the role of the Plant Disease Information Office, and Plant Science Day 2008 by Gerri Hirshey of the New York Times *July 3, 2008*
- Discussed diseases of transplant beds of Christmas tree plantations in Connecticut and advantages of bare root versus plug transplants at the Connecticut Christmas Tree Growers Association Twilight meeting at the Valley Laboratory in Windsor (50 attendees) *July 10*
- Organized and moderated oral paper sessions and answered questions about current diseases of shade and ornamental trees at the Summer Meeting of the Connecticut Tree Protective Association in Farmington (646 attendees) *July 17*
- Hosted a group of talented and gifted high school students to discuss plant pathology and the role of the Plant Disease Information Office of the Experiment Station (2 adult and 20 youth attendees) *July 18*
- Presented a poster entitled "The nation's first agricultural experiment station: discoveries that shaped plant pathology" and participated in a workshop entitled "Fighting *Phytophthora*" at the Centennial Meeting of the American Phytopathological Society in Minneapolis, MN (500 attendees) *July 25-30*
- Was a guest on the "Len and Lisa's Garden Talk" radio program (WTIC) and discussed highlights of Plant Science Day 2008 and answered questions from call-ins *August 2*
- Organized and participated in a career-shadowing program for Katie Martin, a high school student from Thomaston High School *August 11-12*
- Participated in the monthly meeting of the CTPA Board of Directors in New Haven *August 12*
- Assisted the Connecticut Tree Protection Examining Board with administering the oral examination to obtain an arborist license, New Haven *September 9*
- Participated in the September meeting of the Board of Directors of the Connecticut Tree Protective Association in New Haven (12 adult attendees) *September 9*
- Participated in the Connecticut Greenhouse Growers Association's "Evening at the Greenhouse" and answered questions about chrysanthemum white rust and other diseases, Lockwood Farm (25 attendees) *September 11*
- Participated in a conference call with USDA-APHIS-PPQ and state regulatory officials about dealing with this year's outbreak of chrysanthemum white rust *September 15*
- Gave a talk entitled "Handling plant disease emergencies" at the Annual Nursery and Landscape Tour held at the Valley Laboratory in Windsor (51 attendees) *September 16*
- Hosted three Boy Scouts from St. Rita's School in Hamden to discuss the Plant Disease Information Office and other plant-related resources available at the Station (3 youth and 1 adult attendees) *September 23*
- Participated in the workshop "Trees and construction: Preparing for construction and remediating the effects" sponsored by the Connecticut Tree Protective Association, and answered questions about current diseases of Connecticut trees at Sessions Woods Conservation Education Center in Burlington (106 attendees) *September 25*
- Was interviewed by Steve Grant of the Hartford Courant about Septoria leaf spot, an unusual disease of sugar maples this year *September 26*
- Organized and participated in a meeting of the Connecticut Tree Protective Association's "Meeting Planning Committee" to discuss the educational component of the 2009 Annual Meeting in Southington (7 attendees) *September 29*
- Was interviewed about predictions for fall foliage and the impact of tree diseases by Abe Katz of the New Haven Register *September 29*
- Was interviewed about the impact of this year's rainfall on plant health by Pamela Weil for the ESA Newsletter *September 30*

- Was interviewed about the foliar disease of sugar maples in Connecticut and potential tourism with regard to fall color by Eric Campaigne of WSHU-NPR's "All Things Considered" *October 1*
- Was interviewed about Septoria leaf spot of maple and the impact of the disease on fall color in Connecticut by Dan Kain of WFSB TV *October 1*
- Gave a talk entitled "Environmentally friendly methods for managing plant diseases" for the Branford Garden Club Day Group in Branford (65 adult and one youth attendees) *October 2*
- Was interviewed about the disease of maple and how it would impact tree health and fall color by Tetiana Anderson of the Weather Channel *October 3*
- Was interviewed about predicting fall color and the physiology of leaf senescence by Abram Katz of the New Haven Register *October 3*
- Met with Chinese visitors hosted by Dr. DeWei Li and discussed research and outreach programs of the Department of Plant Pathology and Ecology *October 9*
- Was interviewed about Septoria leaf spot of maple and its impact on tree health and foliage color by Derrick Henry of the New York Times *October 10*
- Was interviewed about symptoms of Septoria leaf spot by Jim McDonald of the New York Times Photo Desk, and was asked to contribute a digital photo for Derrick Henry's article *October 14*
- Participated in a meeting of the CTPA Board of Directors *October 14*
- Participated in a conference call for the Foundation Board for the American Phytopathological Society *October 15*
- Participated in a conference call on chrysanthemum white rust with state and national collaborators and APHIS PPQ *October 15*
- Participated in a meeting of Connecticut DoAg Specialty Crop Block Grant Awardees with DoAg cooperator Linda Piotrowicz, and discussed the support role of plant pathology in these projects *October 16*
- Gave a talk entitled "Environmentally friendly methods for managing plant diseases" for the Simsbury Garden Club and answered questions in the "Ask the Expert" part of their meeting (62 attendees) *October 20*
- Gave an invited talk entitled "How to kill a tree in ten easy steps" at the 20th annual conference on Urban and Community Forestry in Connecticut "Who Needs Healthy Trees?" hosted by the Connecticut Urban Forest Council in Wallingford (165 attendees) *October 23*
- Participated in the Connecticut Girls Collaborative Project Convention held at Choate Rosemary Hall in Wallingford where she discussed the mentorship program for underrepresented middle school girls that she is developing with the assistance of Tess Foley (150 attendees) *October 28*
- Participated in the November meeting of the CTPA Board of Directors in New Haven *November 4*
- Gave an invited presentation entitled "What we need to know about powdery and downy mildews on greenhouse crops" (200 attendees) and participated in the "Ask the Experts" session at the New England Greenhouse Conference in Worcester, MA *November 5-6*
- Spoke about the Experiment Station and the Department of Plant Pathology and Ecology to a Botany class from Quinnipiac University in Jenkins (1 professor and 13 student attendees) *November 10*
- Participated in the Cooperative Agricultural Pest Survey (CAPS) meeting and discussed results of the 2008 Surveys of Ramorum Blight and Chrysanthemum White Rust in Windsor (15 attendees) *November 13*
- Participated in a conference call for members of the Board of the APS Foundation (10 attendees) *November 19*

- Participated in the December meeting of the CTPA Board of Directors, Plantsville (15 attendees) *December 4*
- Assisted the Connecticut Tree Protective Examining Board with the administration of the oral component of the Connecticut Arborist Exam *December 10*
- Participated in a conference call of the CTPA Board of Directors to discuss strategies for the Mark McClure Research Fund *December 17*
- Along with Tess Foley, met with the K-12 supervisor of the New Haven Public Schools to discuss developing a partnership and mentorship program *December 22*
- Participated in a conference call with members of the Board of the American Phytopathological Society Foundation *January 8, 2009*
- Gave a presentation entitled "Environmentally friendly methods for managing plant diseases" to the Wallingford Garden Club in Wallingford (75 attendees) *January 13*
- Gave an invited talk entitled "Update on chrysanthemum white rust in Connecticut" at the CNLA/CGGA Winter symposium in Wallingford (60 attendees) *January 14*
- Participated in the CTPA Annual Meeting as a member of the CTPA Board of Directors (720 attendees) *January 15*
- Gave a presentation entitled "Chrysanthemum white rust in Connecticut – What growers need to know" at the Connecticut Vegetable and Small Fruit Meeting in Tolland (175 attendees) *January 22*
- Gave a presentation entitled "Common diseases of woody ornamentals: What bonsai growers need to know" at the January meeting of the Bonsai Society of Greater New Haven at Edgerton Park in New Haven (15 attendees) *January 27*
- Gave a lecture entitled "Understanding plant diseases" as part of the CT NOFA course on organic land care in New Haven (62 attendees) *January 29*
- Participated in the monthly meeting of the Board of Directors of the CTPA (14 attendees) *February 3*
- Presented an invited talk entitled "Combating plant diseases in the nursery" and discussed disease management strategies with attendees at 2009 New England Grows held at the Boston Convention and Exhibition Center in Boston (2,500 attendees) *February 5*
- Participated in the annual CAES-Forest Cooperators Meeting in Jones Auditorium (32 attendees) *February 19*
- Explained service and research efforts of the Department of Plant Pathology and Ecology with FFA teachers (9 participants) *February 27*
- Gave a lecture entitled "What is plant pathology – A career opportunity?" as part of a seminar series "Career Opportunities in Environmental Science" held at Mitchell College in New London (20 attendees) *March 5*
- Participated in the Workshop Committee and Board of Directors meetings of the CTPA in New Haven *March 10*
- Assisted the Connecticut Tree Protection Examining Board with administering the oral examination for arborists in New Haven *March 11*
- Participated in the monthly conference call of the APS Foundation Board of Directors *March 18*
- Gave a presentation entitled "History of Plant Disease – The Irish Potato Famine and more…" as part of the Lecture Series "Hot Topics in the World of Plants" offered by the Shoreline Institute of Lifelong Learning in Guilford (28 attendees) *March 19*
- Participated in the monthly meeting of the Board of Directors of the CTPA in New Haven *April 14*

- Gave a presentation entitled "New ways to control an old foe – Dutch Elm Disease" and organized the program of the CTPA Workshop "Pesticides – An update for the working arborist. New tools for old problems" at the Lyceum in Hartford (89 attendees) *April 16*
- Organized the program and content of the Station's Spring Open House entitled "Gardening in Connecticut" (142 attendees) *April 23*
- Participated in a meeting of the CTPA Education Committee to outline a new workshop on tree preservation (5 attendees) *May 4*
- Presented an invited lecture entitled "History of plant disease – the Irish Potato Famine and more" at the Whitney Center in Hamden (55 attendees) *May 18*
- Participated in the annual Meeting and Award Ceremony for The Community Fund for Women and Girls, of the Community Foundation for Greater New Haven. The Station's Resarch Foundation was presented with a check for a grant that was awarded for a "Middle School Girls Science Mentoring Program." (100 attendees) *May 20*
- Was interviewed about cottonwood trees and why they produce seeds with cotton by Harlan Levy of the Journal Inquirer *June 1*
- Participated in the Connecticut CAPS meeting and discussed diseases of concern for 2010 surveys (12 attendees) *June 2*
- With Tess Foley, participated in a strategic planning conference call with Dr. Richard Therrien, K-12 Science Supervisor for New Haven Public Schools, for the CAES Girls and Science Mentorshop Program (3 participants) *June 8*
- Participated in the CTPA Board of Directors Planning Meeting for the CTPA Summer Meeting at the Farmington Club (12 attendees) *June 9*
- Assisted the Connecticut Tree Protection Examining Board with administering oral arborist examinations *June 10*
- Participated in the *Phytophthora ramorum* on-site USDA-APHIS-PPQ review of CAES facilities and standard operating procedures (12 attendees) *June 16*
- Was interviewed about poison ivy, dermatitis, and why it is so plentiful in Connecticut by Bill Weir of the Hartford Courant *June 19*
- Participated and helped to organize the CNLA/CTPA workshop on Asian Longhorned Beetle at Naugatuck Valley Community College (55 attendees) *June 25*
- Was interviewed about the impact of rainy, cool weather on Connecticut crops by Tom Burgeson of the Connecticut Post *June 26*
- Discussed the mission of the Department of Plant Pathology and Ecology, the function of the Plant Disease Information Office, and techniques used for disease diagnosis with SCSU graduate students of Dr. Gerry Frumento (12 attendees) *June 30*

EITZER, BRIAN D.

- Gave a presentation entitled "Pesticide Residues in Pollen Collected by Foraging Honey Bees" at the 236th national meeting of the American Chemical Society in Philadelphia, PA *August 17, 2008*
- Along with Dr. Kimberly Stoner was interviewed about pesticides in honey bee pollen by Kevin Jacobsen of News 12 Connecticut *September 2*
- Participated in an EPA Regional Laboratory meeting held at the New Hampshire DES Laboratory, Concord, NH *November 6*
- Gave a presentation entitled "Analysis of Pesticide Residues in Honey Bee Pollen by Liquid Chromatography/Mass Spectrometry" at the 47th annual Eastern Analytical Symposium & Exposition in Somerset, NJ *November 17-21*

- Participated in the Southern New England Beekeepers Assembly in New Haven, *November 22*
- Presented a paper on pesticides in honey bee pollen at the American Bee Research Conference in Gainesville, FL *February 4-6*
- Discussed issues related to the effect of pesticide residues on honey bee health at a meeting hosted by the National Resources Defense Council held in Washington D. C. *March 24-25*
- With Dr. Kimberly Stoner gave a talk on "Pesticide Residues in Pollen Collected by Foraging Honey Bees" to the Connecticut Beekeepers Association in New Haven *April 4*
- Presented a seminar on "Pesticide Residues in Pollen Collected by Foraging Honey Bees" to the Department of Plant, Soil, and Insect Sciences at the University of Massachusetts, Amherst *April 7*

ELMER, WADE H.

- Gave a talk on "Diseases caused by species of *Fusarium*" to a group of talented and gifted high school students visiting the Station (2 adult and 20 student attendees) *July 18*
- Presented a poster entitled "The pathogenicity and phylogeny of *Fusarium oxysporum* isolates on *Coreopsis verticillata* 'Moonbeam'" at the Centennial Meeting of the American Phytopathological Society in Minneapolis, MN (500 attendees) *July 25-30*
- Participated in the PH.D. defense examination of Anathep Pasura at The University of Connecticut in Storrs *August 5*
- Was interviewed about Sudden Vegetation Dieback by John Bergstrom of the Connecticut Post *August 6*
- Was interviewed about Sudden Vegetation Dieback by Dan Cain of Channel 3 News *August 7*
- Was interviewed about Sudden Vegetation Dieback by John Bergstrom of the Connecticut Post *August 25*
- Presented two papers entitled "Characterization of *Fusarium* species on *Spartina alterniflora* by morphology, pathogenicity, and genotype" and "Integrated strategies for suppressing *Fusarium* diseases of ornamentals" at the Tenth International Fusarium Symposium and Genomic Conference in Algerho, Sardinia, Italy (250 attendees) *August 28-September 2*
- Gave a presentation entitled "Spread of *Pythium* in ebb and flow irrigation systems" at the Connecticut Greenhouse Growers Association's "Evening at the Greenhouse" held at Lockwood Farm (25 attendees) *September 11*
- Was interviewed about Sudden Vegetation Dieback by Judy Day of the New London Day *September 15*
- Gave a lecture and a lecture/lab on *Fusarium* to a UCONN Introductory Plant Pathology Class in Storrs (9 attendees) *September 17*
- Gave a presentation entitled "Plant parts and their diseases" to first grade students at Mile Creek School in Old Lyme (80 youth and 7 adult attendees) *September 18*
- Was interviewed about pumpkins by Nancy Barnes of the New Milford Times *September 29*
- Was interviewed about the effects of the wet weather on the pumpkin crop in Connecticut by Pamela Weil for the ESA Newsletter *September 30*
- Participated in a conference on Fusarium Genetics and participated in the Ph.D. comprehensive examination of a Ph.D. candidate at the University of Florida in Gainesville, FL (8 attendees) *October 3*
- Co-chaired the Extension/Industry meeting and co-presented the Connecticut extension report with Dr. Francis J. Ferrandino (22 attendees); presented the symposium talk entitled "Influence of N-form, chloride, and manganese on suppression of plant disease" (55 adult attendees); served on the Graduate Student Award committee; presented the talk "Discovery of a new species of *Fusarium* and

the influence of drought on its ability to infect *Spartina alterniflora*"; and presided over the Symposium on Turfgrass Diseases (85 attendees) at the Annual Meeting of the Northeastern Division of The American Phytopathological Society in Newport, RI *October 8-10*

- Gave the presentation entitled "Influence of drought and salinity on infection of *Spartina alterniflora* by a pathogenic *Fusarium* species" and served as the presiding judge for the coveted Stickleback Award at the Biannual meeting of the New England Estuarine Research Society on Block Island, RI (60 attendees) *October 16-18*
- Participated in a field trip of a dieback area on Barn Island, Connecticut, with scientists from Connecticut College, The University of Connecticut, the University of New Haven, and the Department of Environmental Protection (6 attendees) *October 22*
- Gave two talks entitled "Bio-control options for disease control – Part II: Root-rot diseases" (45 attendees) and "Managing plant nutrition to limit disease susceptibility" (28 attendees) at the New England Greenhouse Conference in Worcester, MA *November 5-6*
- Gave the talk "*Fusarium*: Taxonomy and Ecology" to a Botany class from Quinnipiac University in Jenkins (1 professor and 13 student attendees) *November 10*
- Presented a seminar entitled "Possible role of plant pathogens in the decline of salt marshes along the Atlantic seaboard" at Albertus Magnus College in New Haven (8 attendees) *December 3*
- Was interviewed about the effect of weather on plant growth by Brigette Ruthman of the Waterbury Republican-American *December 11*
- Spoke about the ability of corm soak treatments to suppress Fusarium corm rot of gladiolus to the Connecticut Gladiolus Society in Avon (10 attendees) *December 13*
- Presented a talk entitled "Use of biochar in asparagus disease management" at a NERA Planning Grant Conference on the use of biochar at Cornell University in Ithaca, NY (12 attendees) *January 12, 2009*
- Presented the talks "Soil fertility and vegetable crop disease" (25 attendees) and "Asparagus disease management in the northeastern US" (15 attendees) at the 2009 Atlantic Coast Agricultural Convention & Mid-Atlantic Direct Marketing Conference & Trade Shows in Atlantic City, NJ *January 14-15*
- Co-organized and presented a talk entitled "Managing plant nutrition to limit disease susceptibility" at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Tolland (24 attendees) *February 10*
- Co-organized, moderated, and presented a talk entitled "Managing plant nutrition to limit disease susceptibility" at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Jones Auditorium (26 attendees) *February 20*
- Co-organized and presented a talk entitled "Managing plant nutrition to limit disease susceptibility" at the 2009 CAES-UCONN Spring Bedding Plant Workshop in Torrington (25 adult attendees) *February 24*
- Presented the poster "Potential uses of biochar in asparagus disease management" at the Third Connecticut Conference on Natural Resources at UConn in Storrs (150 adult attendees) *March 9*
- Participated in the Perennial Plant Conference at UConn in Storrs *March 12*
- Was interviewed about using earthworms in home gardens by Theresa Barger of the Hartford Courant *March 19*
- Presented the talk "Role of chlorine nutrition in IPM for suppressing plant diseases (52 attendees); and presented the poster "Using earthworms to suppress soilborne diseases (600 attendees) at the session entitled "Role of Mineral Nutrition in IPM for Suppressing Plant Diseases" that he co-organized, at the Sixth International IPM Symposium in Portland, OR *March 23-26*
- Gave a talk entitled "Earthwoms and soil health" to the Bauer Park Gardening Group in Madison (5 attendees) *May 5*

- Spoke about "Plant parts and their diseases" to five first-grade classes at Doolittle School in Cheshire (107 student and 12 adult attendees) *June 5*
- Led the plant pathogen team at the 2009 BioBlitz event at Goodwin College and reported that 26 plant pathogens were identified. The event had over 40 scientists and over 30 collectors (20 student and 10 adult attendees) *June 12-13*

FERRANDINO, FRANCIS J.

- Gave a report on the progress of his research on powdery mildew of grape at the Connecticut Vineyard & Winery Association meeting at the Valley Laboratory in Windsor (11 attendees) *September 9*
- Gave a talk entitled "Powdery mildew on grapes" at the Annual Nursery and Landscape Research Tour held at the Valley Laboratory in Windsor (51 attendees) *September 16*
- Gave a talk entitled "The epidemiology of grape powdery mildew" to a Botany class from Quinnipiac University in Jenkins (1 professor and 13 student attendees) *November 10*
- With the help of Dr. Richard Kiyomoto, has deployed five remote-accessed weather stations in Connecticut as part of his grape IPM project. Three of the stations are located at the Station's three experimental sites, two others are at commercial vineyards in New Preston and Colchester. The collected data are accessible on the Web (https://www.hobolink.com/s/d0696313715dd96f86b25f3552cc1f47) *February, 2009*
- Gave an invited talk "The interaction of the spatio-temporal heterogeneity of inoculum release and host susceptibility" at the Workshop on "Models and Methodological Problems of Botanical Epidemiology" held at the Center for Discrete Mathematics and Theoretical Computer Science at the Rutgers University CoRE campus located in Piscataway, NJ (27 attendees) *March 16-18*
- Gave a talk on grape powdery mildew at the Sikorsky Earth Day event held in Trumbull (12 attendees) *April 29*
- Gave the talk "Sampling disease rating and analysis for models of spatially aggregated plant disease epidemics" and coauthored a poster presentation entitled "Some consequences of using the Horsfall-Barratt scale for estimating disease severity compared to nearest percent estimation" at the 10th International Epidemiological Workshop in Geneva, New York (65 attendees) *June 8-12*

FOLEY, TESS

- Presented information on Lyme disease, West Nile virus and Indoor mold and air quality at the GE Health and Safety Day at GE Financial, Danbury (250 attendees) *July 22, 2008*
- Met with marketing representatives fro the Connecticut Department of Agriculture to discuss the Station's Specialty Crop Block Grant *July 24*
- Participated in a conference call with executives from Webster Bank to discuss site tour of Station and Lockwood Farm for funding consideration *July 28*
- Toured the Yale Farm and met with representatives from Yale Community Sustainable Agriculture Project *July 29*
- Participated in a conference call with Drs. Jeffrey Ward and Scott Williams and their funders from the Propane Education Research Council to discuss progress on the invasive Japanese barberry and tick population control research *August 8*
- Attended the National Girls' Collaborative Project, sponsored by the National Science Foundation, STEM Conference at Choate Rosemary Hall to connect mentors to programs in STEM to help close the gender gap for girls in science, technology, engineering, and math. (200 attendees) *October 2008*
- Was interviewed by the New Haven Register about the Station's new Girls' Science Mentorshop Program *October 2008*

- Participated in the CT Farm Bureau's Annual Meeting (300 attendees) *November 2008*
- Participated in a consultation call about issues of importance in farming and farmland preservation with the policy director for Terry McAuliffe *January 26, 2009*
- Held a conference call with the National Produce for Better Health Foundation, with Dr. Abigail Maynard, to discuss a joint outreach campaign to CT farmers and growers *February 13*
- Held a conference call with the Propane Education Resource Council with Drs. Jeff Ward and Scott Williams to discuss funding for their barberry research *February 25*
- Attended Connecticut's Agricultural Day at the Capitol in Hartford to promote the Station's Research, and participated with Terry Jones and Jamie Jones of Jones Family Farms in informational meeting to promote key issues of CT farmers *March 18*
- Presented an overview of the work of the CAES and the research being conducted for CT Agriculture at the Fairfield County Farm Bureau "Grow Your Own Workshop" at the Extension Center in Bethel, CT (5 attendees) *March 28*
- Was interviewed on WMNR radio about her work at the Station *March 29*
- Along with Dr. Kimberly Stoner and Dr. Hugh Smith, represented the Experiment Station at the CT Folk Festival kick-off event on Earth Day to promote awareness of this year's CT Folk Festival and Environmental Green Expo at the Peabody Museum (140 attendees) *April 22*
- Organized Sation participation at Sikorsky Aircraft Corporation's two Earth Day events at Sikorsky sites (200+ participants) *April 29*
- Hosted the CAES display table at the Gateway Community College "Girls Go Green" event promoting environmental and scientific careers to female students *May 1*
- Conducted a radio interview with Dr. Kim Stoner on WMNR CT public radio about her honey bee and pollinator research *May*
- Conducted a radio interview with Linda Piotrowicz on WMNR CT public radio *June*

GENT, MARTIN P. N.

- Presented posters on "Effect of Shade on Water and Nutrient Use in Greenhouse Tomato" and "Effect of Plant Size on Diurnal Variation of Nitrate and Sugars in Lettuce" at the American Society for Horticultural Science Meeting in Orlando, Florida (1,000 attendees) *July 21-24, 2008*
- Hosted a visit at Lockwood Farm by Joe Donato and staff from Woodbury Farm to examine the greenhouse tomato and lettuce operations and discuss hydroponics *August 1*
- Gave a talk on "A novel phytoremediation system for soils contaminated with persistent organic pollutants' in a session on Phytoremediation at the International Congress for Plant Pathology in Torino, Italy (30 attendees) *August 26*
- Organized "An Evening in the Greenhouse" event with Bob Heffernan of the Connecticut Greenhouse Growers' Association, featuring an open house of the greenhouses at Lockwood Farm and a program of talks including "Plant response to partial saturation ebb & flow watering (30 attendees) *September 11*
- Discussed research projects with a class of students from Sound School who visited the greenhouses (20 student and 3 adult participants) *September 22*
- Was interviewed about hydroponic production of vegetables by Jackie Brenning of the Waterbury Republican *September 24*
- Presented the poster "A dynamic linear model of water movement in whole plants" at the Plant Collaborative Workshop on developing common models for molecular mechanisms, crop physiology, and ecological studies" held at the Biosphere Arizona at the University of Arizona (100 attendees) *November 8-9*

- Discussed the installation of a chlorine sterilization system with officials from Hanna Instruments at the Ebb and Flow greenhouse *November 18*
- Along with Michael short, participated in a workshop on alternative greenhouse crops in Sturbridge, MA December 12
- Participated in a Steering Committee Meeting for he New England Vegetable and Fruit conference, Manchester, NH (15 Extension personnel) December 18
- Visited a hydroponics production farm for lettuce and salad greens and discussed nutrition and other aspects of growing plants hydroponically at Woodbury Farm *December 19*
- Participated in a meeting to discuss research and funding concerning agricultural use of biochar in Ithaca, NY *January 12, 2009*
- Presented a research poster on "Ebb and Flow Watering" at the Annual Winter meeting of the Connecticut Nursery and Landscape Association in Wallingford (200+ attendees) *January 14*
- Participated in a steering committee meeting of the New England Vegetable and Fruit Growers in Manchester, NH (10 attendees) *January 27*
- Spoke on his interactions with their program and participated in a meeting to evaluate the Sound School Agricultural Program at that school in New Haven (15 educators, 5 others) *February 3*
- Gave a talk on "Life in the Greenhouse at The Connecticut Agricultural Experiment Station" to the Meriden Men's Y group at the YMCA in Meriden (40 attendees) *March 3*
- Gave a talk on "The use of row covers, high tunnels, and cold frames in Connecticut at the Cheshire Suburban Garden Club (20 attendees) *March 18*
- Gave a talk on "Life in the Greenhouse at The Connecticut Agricultural Experiment Station" at the 65th birthday symposium for Dr. James Prestegad at the University of Georgia (40 attendees) *March 20-21*
- Gave a talk on "Extending vegetable production using cold frames and row covers" to Greens Farms Garden Club in Westport, CT (25 attendees) *April 7*
- Visited Sound School Agriculture Class at Pardee Greenhouse in New Haven to discuss prospects and problems with hydroponic vegetable production (10 students) *May 15*
- Participated in an open house at Geremia Greenhouse in Wallingford to propose a publicly-funded demonstration greenhouse for new technology (50 attendees) *May 15*
- Participated in the NE1035 Regional Research Committee Meeting on Commercial Greenhouse Production: Component and System Development at Laval University, Quebec City, Canada (20 attendees) *June 14*
- Presented talks on "Rapid watering to achieve partial saturation of root medium on flooded floors" and "Measurement and modeling of diurnal variation of nitrate and sugars" at GreenSys 2009, the International Society of Horticultural Science Symposium on High Technology for Greenhouse Systems in Quebec City, Canada (200 attendees) *June 15-18*

HISKES, ROSE T.

- Was interviewed about biting insects by Jason Cunningham of the Journal Inquirer (Manchester, CT) *July 8, 2008*
- Staffed a Cooperative Agricultural Pest survey booth at the Connecticut Nursery and Landscape Association summer meeting in Lebanon (435 attendees) *July 16*
- Staffed The Connecticut Agricultural Experiment Station's question and answer booth at the Connecticut Tree Protective Association summer meeting in Farmington (676 attendees) *July 17*
- Spoke about insects to the Talented and Gifted Program of New Haven School System (40 students) *July 18*

- Participated in a Connecticut Invasive Plants Working Group Symposium Planning Committee meeting in Windsor *July 24*
- Was interviewed about the Asian Longhorned Beetle by Steve Kobak of the Norwalk Hour *August 20*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor *August 18*
- Was interviewed about the Asian Longhorned Beetle by Jim Essling of the Worcester Telegram *September 10*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor *September 8 and 22*
- Gave a tour of the Connecticut Nursery and Landscape Education Gardens and an arthropod and pesticides update at the Nursery and Landscape Research Tour at the Valley Laboratory in Windsor *September 16*
- Gave a talk on "Houseplants" to the East Haddam Garden Club in East Haddam (30 attendees) *September 17*
- Staffed the USDA Cooperative Agricultural Pest Survey booth at the Big E *September 20 and 23*
- Gave a talk on "Invasive Plants of Connecticut and Their Management" to the Friends of Boulder Knoll Learn Today, Grow Tomorrow Program (12 attendees) *September 28*
- Was a session moderator at CIPWG symposium in Storrs (395 attendees) *October 1*
- Taught an adult education class "Trees and Shrubs for the Fall Landscape" in Windsor (4 attendees) *October 4*
- Gave the talk "Invasive Plants in Connecticut" to the Oxford Land Trust (15 attendees) *October 23*
- Taught the naturalist and forester badges for Cub Scout Pak 389 in south Windsor (22 attendees) *October 25*
- Gave a talk on insects to inmates at the Charles Manson Youth Institute in Cheshire (15 attendees) *October 29*
- Participated in a CIPWG steering committee meeting in Windsor *November 5*
- Gave a talk on the Asian Longhorned Beetle to the Connecticut Maple Syrup Producers in Storrs (70 attendees) *November 8*
- Hosted and chaired a meeting of the State Cooperative Agricultural Pest Survey Committee in Windsor (12 attendees) *November 13*
- Participated in a National Cooperative Agricultural Pest Survey (CAPS) Committee meeting in Phoenix, AZ *December 2-4*
- Staffed an APHIS-PPQ firewood outreach booth at the RV & Camping show in Hartford *January 9, 2009*
- Provided Asian Longhorned Beetle outreach material to the Connecticut Maple Syrup Producers Association in Windsor *January 17*
- Gave a talk on Organic Management of Insect Pests of Ornamentals and Turf at the NOFA Organic Landcare Course in Leominster, MA (65 attendees) *January 20*
- Participated in a meeting with the Connecticut Tree Protective Association and the Department of Information Technology on putting the Pesticide Guide Toward IPM for Arborists on the web in East Hartford *January 22*
- Gave a talk on "Introduction to insects" to the Connecticut Orchid Society in Cheshire (25 attendees) *February 11*
- Gave a talk on "Native Plants for Connecticut Gardens" to landscapers at Planter's Choice Nursery in Newtown (40 attendees) *February 17*

- Participated in a meeting with USDA APHIS PPQ and DEP Forestry regarding an Asian Longhorned Beetle Outreach and Survey Project in Wallingford *February 18*
- Participated in a meeting with the Connecticut Tree Protective Association and the Department of Information Technology on putting the Pesticide Guide Toward IPM for Arborists on the web, East Hartford *February 25*
- Chaired a state CAPS Committee meeting on Asian Longhorned Beetle Outreach *March 3*
- With Todd Mervosh and Greg Bugbee, gave a training session on "Invasive Plants" to municipal and state officials in New Haven *March 5*
- Gave a talk on "Insects: the Good, the Bad, and the Beautiful and the Just Plain Ugly" to the Shoreline Institute of Lifelong Learning in Guilford (20 attendees) *March 12*
- Gave a talk on "Growing Natives to Sustain Birds, Bees, and Butterflies" to Master Gardeners in Manchester (20 attendees) *March 21*
- Participated in the CAPS meeting as the State Survey Coordinator for Connecticut, and participated in discussions on data management, GIS mapping, surveys, and taxonomy at the 84th Annual Meeting of the Eastern Plant Board, Portland, Maine *April 6-9*
- Chaired a meeting of the Connecticut Asian Longhorned Beetle and Emerald Ash Borer Outreach team in Windsor *April 14*
- Was interviewed about bees by Mr. Kerry of the Waterbury Republican *April 14*
- Participated in a regional conference call of the NE Exotic Forest Pest Outreach and Survey Team *April 16*
- Gave a talk on "Invasive Plants" to the Vernon Greenways Volunteers in Vernon (20 attendees) *April 27*
- With Dr. Kirby Stafford, assembled and presented a poster on Asian Longhorned Beetle, Emerald Ash Borer and Don't Move Fiewood to the Connecticut Groundskeepers at Lockwood Farm in Hamden *May 4*
- Taught a course "Trees and Shrubs for Connecticut Gardens" in Windsor May 7,14, and 21
- Gave a talk on Asian Longhorned Beetle, Emerald Ash Borer, Don't Move Firewood to the Connecticut Campground Owners Association in Losbon *May 13*
- Participted in two regional conference calls of the NE Exotic Forest Pest Outreach and survey Team *May 14, 28*
- Organized and taught at a Train-the-Trainer workshop for Asian Longhorned Beetle, Emerald Ash Borer and Don't Move Firewood in Windsor *May 19*
- Gave a talk on"Vegetables and Frought" to the Enfield Garden Club in Enfield *May 27*

HUANG, SHAOMING

- Presented an invited talk "Genetic variation in populations of *Culex pipiens* from the northeastern and Midwestern United States" at the Annual Meeting of the Northeastern Mosquito Control Association, held in Providence, RI (100 attendees) *December 8, 2008*

INMAN, MARY K.

- Spoke on "Houseplants, general care, and diagnosis of common problems" to the Men's Garden Club of Greater Bridgeport in Stratford (17 attendees) *October 15, 2008*
- Gave the talk "General care and common problems of houseplants" to the Branford Garden Club in Branford (16 attendees) *January 12, 2009*
- Gave the talk "Plant propagation" to the Newtown Garden Club in Newtown (30 attendees) *January 27*

- Gave a talk entitled “Pruning woody ornamentals” to the Branford Garden Club in Branford (30 attendees) *March 5*
- Spoke about Experiment Station services available to the public to a group at the Russell Public Library, as part of their “Green Children” Program to involve families in vegetable gardening in Meriden (22 adult attendees) *May 20*
- Gave a talk entitled “Pruning woody ornamentals” to the Olde Ripton Garden Club in Shelton (24 attendees) *June 1*

KETTLE IRA J.

- Presented the talk “Bees in Fair Haven” with questions and answers afterward at the Fair Haven Library in New Haven (3 adult and 12 youth participants) *July 10, 2008*
- Presented a honey bee talk “Live Bees” and showed equipment used for beekeeping and had a question and answer session at the Stetson Public Library in New Haven (8 adult and 50 youth participants) *July 15*
- Presented a live honey bee exhibit and gave a talk “Hear the Buzz” with questions and answers afterward for the Wilson Library in New Haven (17 adult and 65 youth participants) *July 16*
- Gave a short talk and answered questions for a second group at the Wilson Library (7 participants) *July 16*
- Set up a live honey bee display and gave a talk about bees, with a question and answer period following, at the East Hampton Public Library (50 attendees) *July 24*
- Was interviewed about C.C.D. and Varroa mites by Tina DeTelj of Channel 8 News *September 23*
- Was interviewed about honey (shelf life, crystallization) at the Big E on FM Radio 102.9 *September 20*
- Was the featured speaker on “The role of Bees as Pollinators” at the Friends of Valley Falls’ “An Afternoon at the Farm” gathering in Vernon (25 attendees) *September 28*
- Was featured in the Friends of Valley Falls’ Fall Newsletter 2008 *September issue*
- Provided a honey bee display and information booth at the Brookvale Fall Festival in Hamden (1,200 visitors) *October 18*
- Gave a bee demonstration and talk on “Climate Change & Bees” for the Lego-League with Beth Johnson, Science & Technology in Suffield (16 attendees (adults & children) *November 11*
- Helped staff an exhibit and answer questions on Asian Longhorned Beetle and honey bees at the 27th Annual CT Flower & Garden show held at the CT Convention Center in Hartford (20,000 visitors to the show) *February 19-22, 2009*
- Gave a talk on bees at the Cherry Brook Garden Club in Canton (35 attendees) *March 10*
- Provided a Bee Demonstration for senior citizens at Russell Mercier Center in Hebron (20 attendees) *March 17*
- Arranged an exhibit and worked at the Station’s display for the 11th Annual Garden Expo held in Fairfield (2,000 attendees) *March 21-22*
- Spoke to the Trillium Garden Club at the Groton Public Library in Groton (30 attendees) *March 23*
- Gave a presentation on honey bees for the Hungerford Park Youth Day held at the Hungerford Park in Kensington (150 attendees) *April 25*
- Gave a honey bee presentation for children in the after school Agricultural/Environmental Program at Lake Street School in Vernon (25 participants) *April 27*
- Gave a honey bee presentation to The Goshen Garden Club (70 attendees) *May 7*
- Presented live bees at the Norwalk Tree Festival (750 attendees) *May 16*

- Set up a display of the Asian longhorned beetle and Emerald ash borer and gave a presentation on the severity of both types of infestations at Panthorn Park in Southington (150 children and 20 adult attendees) *June 4*

KROL, WALTER

- Participated in an EPA Regional Laboratory Meeting held at the New Hampshire DES Laboratory, Concord, NH *November 6, 2008*
- Presented a poster "Pesticide Residue Program at a Glance" at Earth Day Celebration held at Sikorsky Aircraft, Stratford, CT (1000 attendees) *April 22, 2009*
- Hosted students and teachers from High School in the Community and gave a demonstration on how washing produce under tap water reduces pesticide residues in fresh produce *May 28*
- Organized an awards banquet that was part of the New Haven Section of the American Chemical Society National Chemistry Week in Jones Auditorium *June 3*
- Was interviewed about the benefits of rinsing produce under tap water toremove pesticide residues by Lauren Parajon of Prevention Magazine *June 15*

LAMONDIA, JAMES A.

- Was interviewed by Gregory Hladky of the Boston Globe about Station research and services and the role of cigar tobacco farms in maintaining agriculture and open space in the Connecticut River Valley *July 22, 2008*
- Was interviewed about the effect of weather on tobacco diseases by Johnnie Perdue of the USDA Risk Management Agency *August 7*
- Met with Bill Manning of the University of Massachusetts and Julia Kuzovkina of UConn to discuss progress on a cooperative ozone damage experiment at the Valley Laboratory *August 7*
- Was interviewed about the impact of hail on broadleaf cigar tobacco farms by Doug Green of Channel 30 *August 14*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *September 9*
- Spoke about cover crops for disease and nematode management and spoke about biofumigation and biodiesel oilseed crops at the Valley Laboratory Nursery and Landscape Research Tour *September 16*
- Was interviewed about 2008 tobacco diseases by the New England Agricultural Statistics Service *October 2*
- Gave a lecture and a lab exercise on the role of fungi in plant diseases and Botrytis resistance to fungicides at the Valley Lab to students from Central Connecticut State University *October 2*
- Spoke about research results at the annual meeting of the Northeast Regional Multistate Nematology Technical Committee (NE-1019) held in Newport, RI (12 attendees) *October 6-8*
- Presented "Resistance to blue mold in Connecticut shade tobacco" at the Northeast Division meeting of the American Phytopathological Society in Newport, RI (40 attendees) *October 8-10*
- Conducted a day-long train-the-trainer NE-SARE Professional Development Program Workshop on "Diagnosis, Visual Assessment and Management of Plant-Parasitic Nematodes of Vegetables and Small Fruit in the Northeast" as a part of the NED APS program (10 attendees) *October 10*
- Discussed his research at the fall meeting of the Station Board of Control held at the Valley Laboratory *October 15*

- Attended the fall meeting of the New England Estuarine Research Society at Block Island, RI and spoke about "*Meloidogyne spartinae* and a *Fusarium* sp. as possible stresses associated with decline of the salt marsh grass *Spartina alterniflora*" (60 attendees) *October 15-18*
- Conducted a day-long train-the-trainer NE-SARE Professional Development Program Workshop on "Diagnosis, Visual Assessment and Management of Plant-Parasitic Nematodes of Vegetables and Small Fruit in the Northeast held in Westampton, NJ (17 attendees) *October 21*
- Taught a class on identification, biology and management of tree diseases to students in the Connecticut Tree Protective Association's Arboriculture 101 class in New Haven (42 students) *October 22*
- Met with Nancy Simcox, research industrial hygienist at the Center for Indoor Environments and Health of the University of Connecticut Health Center at the Valley Laboratory to discuss a tobacco worker safety research project and participation in the CAES Tobacco Research Meeting *October 23*
- Presented a Plant Pathology lecture on nematode biology, diseases, sampling and management, and a laboratory exercise on plant parasitic nematode extraction and identification at the University of Connecticut (9 student attendees) *November 5*
- Conducted a day-long train-the-trainer NE-SARE Professional Development Program Workshop on "Diagnosis, Visual Assessment and Management of Plant-Parasitic Nematodes of Vegetables and Small Fruit in the Northeast", Allentown, PA (22 attendees) *November 18*
- Participated in a "Community collaboration for farm worker health and safety" held by the Northeast Center for Agricultural Health in East Windsor *December 4*
- Participated in a meeting of the Connecticut Agricultural Information Council to plan Ag Day at the Capitol *December 11*
- Was interviewed about root-knot nematodes and wetland dieback by Joseph Ingoldsby for Orion Magazine *January 2, 2009*
- Participated in a conference call with growers and extension personnel from southeast Pennsylvania about nematode management *January 14*
- Spoke about "Identifying and managing nematode diseases of vegetable and small fruit crops" at the Connecticut Vegetable and Small Fruit Growers Conference in Vernon (175 attendees) *January 22*
- Participated in a meeting of the Connecticut Agricultural Information Council to plan Ag Day at the Capitol *January 26*
- Participated in a special meeting of the Connecticut Tree Protection Examining Board in New Haven *February 11*
- Hosted and spoke about research at the CAES Tobacco Research Meeting for Growers in Suffield *February 17*
- Participated in a meeting of the Connecticut Agricultural Information Council in Windsor *February 23*
- Was interviewed about garden vegetable production by Theresa Sullivan-Barger, free-lance journalist for the Hartford Courant *February 25*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *March 11*
- Taught a session on tree diseases as a part of arboriculture 101 in New Haven (40 students) *March 11*
- Was interviewed about shade tobacco culture and production and the economy by Mark Herz of National Public Radio *March 13*
- Spoke about research, services, and summer employment at the Station at the Central Connecticut State University Biology Department Career Fair (40 attendees) *March 16*

- Participated in Ag Day at the Capitol as a member of the Connecticut Agricultural Information Council *March 18*
- Participated in a planning meeting of grape-IPM researchers conducted by Frank Ferrandino at the Valley Laboratory *March 24*
- Spoke about research on tobacco root disease management and results of the breeding program for multiple pathogen resistance at the CPS Tobacco Growers meeting held in Windsor Locks (120 attendees) *April 15*
- Conducted a day-long Train-the-Trainer NE-SARE Professional Development Program Workshop on "Diagnosis, Visual Assessment, and Management of Plant Parasitic Nematodes of Vegetables and Small Fruit in the Northeast" in Monmouth, Maine (24 attendees) *May 6*
- Participated in a meeting of the Connecticut Agricultural Information Council to select the winner of the Century Farm Award *June 3*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *June 10*

LI, DEWEI

- Gave presentations of his research on indoor fungi and fungal biosystematics to Hubei Academy of Forestry (40 attendees) *September, 2008*
- Gave presentations of his research on indoor fungi and fungal biosystematics to Key Laboratory of Biotechnology at Xuzhou Normal University (25 attendees) *September*
- Gave presentations of his research on indoor fungi and fungal biosystematics to College of Forestry and Natural Resources at Beijing Forestry University (20 attendees) *September*
- Gave a walking tour on fungi to the mycology class of Dr. Barbara Nicholson of the Biology Department at Central Connecticut State University at the Valley Laboratory (14 student attendees, 1 instructor) *October 2*
- Coordinated a visit to the Station (Valley Lab and New Haven) by 3 Chinese administrators doing internships at OPM *October 9*
- Made a presentation "Mycology, Indoor Fungi, and Biotechnology" to 19 senior students of a biology class at Windsor High School *May 14*
- Hosted a Chinese delegation from Hubei Provincial Academy of Forestry visiting CAES *May 25-26*

MAGNARELLI, LOUIS A.

- Welcomed students from New Haven High School's Talented and Gifted Program and spoke about Station research programs *July 18, 2008*
- Was interviewed by Steve Savino of WQUN Radio in Hamden about Plant Science Day *August 1*
- Was interviewed about Plant Science Day by Jim Buchanon of WICC Radio in Bridgeport *August 5*
- Was interviewed about Plant Science Day by Brian Smith of WICC Radio in Bridgeport *August 5*
- Was interviewed about Asian longhorned beetles by Nancy Cohen of NPR Radio *August 8*
- Was interviewed about Asian longhorned beetles by Bob Miller of the Danbury News Times *August 11*
- Was interviewed about antibody production in horses due to West Nile virus infection by Lucy Goodchild of the Society for General Microbiology *August 20*
- Was interviewed about Lyme disease and spirochete strains by Abe Katz of the New Haven Register *August 22*
- Participated in a Working Lands Alliance meeting in Hartford *September 9*

- Participated in a Legislative Invasive Plants Council meeting in Windsor *September 9*
- Participated in a Connecticut Greenhouse Growers' Association meeting at Lockwood Farm in Hamden *September 11*
- Welcomed 55 persons who were taking a course in environmental studies in Jones Auditorium and gave an update on Station research *September 22*
- Participated in the annual meeting of the northeastern multistate research project on controlling plant parasitic nematodes in Newport, Rhode Island *October 7-8*
- Met with Board members of the Experiment Station Associates and gave a report on Station research *October 29*
- Met with officers and council members of the Connecticut Academy of Science and Engineering to explore possible scientific studies to be done in the state *October 30*
- Gave a report on Station research projects to the Board of the Experiment Station Associates *December 4*
- Participated in an Invasive Plants Council meeting at the Valley Laboratory *December 9*
- Spoke on the Station budget needs at a Farm Bureau meeting in Windsor *December 10*
- Welcomed 3 high school teachers and 37 students participating in the Education Connection tour program in Jones Auditorium *December 15*
- Participated in the Invasive Plants Council meeting at the Valley Laboratory in Windsor *January 16, 2009*
- Participated in a New Haven County Farm Bureau meeting in Jones Auditorium and gave a report on Experiment Station research *January 27*
- Welcomed state residents attending the talks and tours given by staff members in the Department of Analytical Chemistry *January 29*
- Was interviewed by John Charlton of Fox 61TV about food and other product testing conducted at the Experiment Station *January 29*
- Gave a report on research findings at a Board meeting of the Experiment Station Associates *February 2*
- Spoke on Experiment Station research at an Invasive Plants Council meeting in Windsor *February 10*
- Welcomed attendees of the Forest and Parks Association in Jones Auditorium and gave an overview of Station research programs *February 11*
- Welcomed bedding plant growers in Jones Auditorium and gave a brief overview of Station research programs *February 20*
- Welcomed the Future Farmers of America to the Station at their annual meeting in Jones Auditorium *February 27*
- Welcomed members of the Federated Garden Clubs of CT in Jones Auditorium and reviewed some highlights of Station research *March 24*
- Welcomed members of the Experiment Station Associates at their annual meeting in Jones Auditorium and gave an update of Experiment Station activities *March 30*
- Made opening remarks at the Station's annual Spring Open House in New Haven (142 attendees) *April 23*
- Participated in a Board meeting of the Experiment Station Associates and gave a report on research programs at the Station *April 27*
- Participated in a meeting of an adaptation subcommittee of the Governor's Steering Committee on Climate Change in Windsor *April 27*

- Participated on a subcommittee meeting of the Governor's Committee on Effects of Climate Change on Agriculture in Windsor *May 11*
- Was interviewed on insect pests of ash trees by Terry Dunkel, a freelance writer *May 20*
- Welcomed visitors from China and spoke about research programs at the Station *May 26*
- Was interviewed about invasive plants by Nancy Cohen of CT Public Radio *June 19*

MAIER, CHRIS T.

- Presented a display on new entomological literature and on the new infestation of the Asian longhorned beetle in Worcester, MA, at a meeting of the Connecticut Entomological Society in Jones Auditorium *October 17, 2008*
- Spoke about apple pest problems during the 2008 growing season while attending the Annual New England, New York, and Canadian Fruit Pest Management Workshop in Burlington, VT *October 21*
- Spoke about the first discovery of an exotic mollusk, the brown banded snail, in Connecticut at a meeting of the Advisory Committee of the Cooperative Agricultural Pest Survey at the Valley Laboratory, Windsor *November 13*
- Discussed funding of wildlife projects at a meeting of the Invertebrate Subcommittee of Connecticut's Endangered Species Advisory Committee at the University of Connecticut, Storrs *November 21*
- Displayed live specimens of the bruce spanworm and a poster on topics discussed at a fruit IPM meeting at the Annual Meeting of the Connecticut Pomological Society in Glastonbury *December 2*
- Displayed a collection of invasive insects and a poster on the brown marmorated stink bug at the Annual Meeting of the Connecticut Tree Protective Association in Southington *January 15, 2009*
- Spoke on "Alien Insects That Could Threaten Agriculture and Biodiversity in Connecticut" at a meeting of the Connecticut Entomological Society in Jones Auditorium *January 16*
- Spoke on "Overview of Alien Longhorned Beetles (Cerambycidae) in Eastern North America" at the Forest Health Monitoring Workshop in Jones Auditorium *February 19*
- Displayed new entomological literature at a meeting of the Connecticut Entomological Society at the University of Connecticut, Storrs *February 20*
- Discussed invasive beetles with Philip Perkins,Curator, while working with the cerambycid collection at the Museum of Comparative Zoology, Harvard University, Cambridge, MA *February 24*
- Participated in discussions about the Asian longhorned beetle at a committee meeting of the Cooperative Agricultural Pest Survey at the Valley Laboratory, Windsor *March 3*
- Displayed a poster on "Invasive Alien Insects in Connecticut" at the Third Annual Connecticut Conference on Natural Resources at the University of Connecticut, Storrs *March 9*
- Discussed ongoing research on cerambycids with Stefan Cover and Philip Perkins, Curators, while examining the insect collection at the Museum of Comparative Zoology, Harvard University, MA *March 26*
- Displayed new entomological literature and U.S. postal stamps at the Annual Dinner Meeting of the Connecticut Entomological Society in Jones Auditorium *April 17*
- Spoke about the discovery of the brown marmorated stink bug, a potential fruit pest, in Connecticut during a Twilight Meeting of the Connecticut Pomological Society at the Silverman Farm in Easton *April 28*
- Spoke about a premature emergence of periodical cicadas in orchards at a Twilight Meeting of the Connecticut Pomological Society held at Blue Hills Orchard in Wallingford (75 attendees) *June 10*

- Spoke about the biodiversity of two-winged flies (Diptera) while participating in the Keney Park BioBlitz, based at Goodwin College, East Hartford (200 attendees) *June 13*

MARRA, ROBERT E.

- Gave a talk about the use of molecular biology in plant disease diagnostics to a group of talented and gifted high school students visiting the Station (2 adult and 20 youth attendees) *July 18, 2008*
- Presented the talk "Fungal mating systems: What we know, what we don't know" at a conference and workshop titled "analogies in the Evolution of Gender Expression and Sexual Strategies in Animals and Plants" in Stuttgart, Germany (85 attendees) *September 10-14*
- Participated in the 20th Annual Conference on Urban and Community Forestry in Connecticut "Who Needs Healthy Trees?" hosted by the Connecticut Urban Forest Council in Wallingford *October 23*
- Gave a talk entitled "Molecular methods in Ramorum blight diagnostics" to a botany Class from Quinnipiac University in Jenkins (1 professor and 13 student attendees) *November 10*
- Hosted a Ph.D. student in forest pathology from the University of Massachusetts, Amherst to supervise him on the SSCP technique in his laboratory – Dr. Marra is on the student's Ph.D. Committee *November 14*
- Participated in a workshop on "Urban and Community Forestry" at the Connecticut Forest and Park Association's annual forum entitled "Public Benefit of Forests: What Are They Worth?" at UCONN (20 attendees) *November 25*
- Gave the lecture "Introduction to mycology" to participants in the University of Connecticut Cooperative Extension Advanced Master Gardener Program for Fairfield County in Bethel (26 attendees) *January 12, 2009*
- Gave the lecture "Fungi of the forests: Friends and foes" to participants in the University of Connecticut Cooperative Extension Advanced Master Gardener Program for Fairfield County in Bethel (26 attendees) *January 26*
- Participated in a meeting of the Steering Committee for the Connecticut Conference on Natural Resources at UCONN in Storrs *February 19*
- Spoke about the use of molecular diagnostics in identifying *Phytophthora ramorum* to students in Dr. Thomas Mione's class at Central Connecticut State Unviersity (18 attendees) *June 10*
- Demonstrated and explained the work plan for *Phytophthora ramorum* molecular diagnostics for the *Phytophthora ramorum* on-site USDA-APHIS-PPQ review of CAES facilities and standard operating procedures (12 attendees) *June 16*
- Spoke about our participation in the annual survey for *Phytophthora ramorum* and the use of molecular diagnostics in its detection to high school teachers from Dr. Gerry Frumento's class at Southern Connecticut State University (12 attendees) *June 30*

MATTINA, MARYJANE I.

- Participated in the FDA FERN National Meeting in Denver, CO *July 29-31, 2008*
- Participated in an EPA Regional Laboratory Meeting held in Concord, New Hampshire *November 6*
- Gave a talk and tour of the Analytical laboratories to media, two state representatives, personnel from the US FDA, FBI, and Consumer Reports, as well as the general public *January 29, 2009*
- Participated in the national meeting of the FDA Food Emergency Response Network (FERN) in Dallas, TX *June 16-19*

MAYNARD, ABIGAIL A.

- Spoke about the New Crops Program at Lockwood Farm to a class from Southern Connecticut State University (15 middle and high school teachers) *July 10, 2008*
- Discussed the New Crops Program on WTIC AM-1080 radio talk show "Garden Talk" *August 2*
- Manned an Experiment Station table and answered questions at the Waterbury Farmer's Market (30 contacts) *August 7*
- Judged fruits and vegetables at the North Haven Fair *September 4*
- Discussed the New Crops Program to participants of the Greenhouse Growers Conference at Lockwood Farm *September 11*
- Talked about beach plums and Japanese plums on the Nurserymen's Research Tour at the Valley Laboratory (60 attendees) *September 16*
- Participated in a meeting of the Solid Waste Advisory Committee in Hartford *September 23*
- Participated in a meeting of the Subcommittee on Organics Recycling and Composting in Hartford *September 23*
- Gave a tour of Lockwood Farm and discussed the New Crops Program to the 3rd Grade Class of Hamden Hall Country Day School (32 student and 2 adult participants) *September 29*
- Gave a tour of Lockwood Farm to Pre-K and Kindergarten classes from Hamden Hall Country Day School (35 children, 4 teachers) *October 14*
- Participated in a meeting of the Solid Waste Advisory Committee at DEP headquarters in Hartford *November 17*
- Reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation in Windsor *November 18*
- With Dr. David E. Hill, attended the Soil Survey Planning Conference in Tolland *November 20*
- Participated in the annual meeting of the Connecticut Pomological Society in Glastonbury December 2
- Spoke about the New Crops Program to a biology class at Hamden Hall Country Day School (1 teacher and 10 student attendees) *December 4*
- Worked with upper class school students at Hamden Hall Country Day School on their science projects (14 students, 2 teachers) *January 22, 2009*
- Participated in a meeting of the Solid Waste Advisory Committee at DEP *January 27*
- Worked with students at Hamden Hall Country Day School with their science projects (41 students, 3 teachers) *February 5 & 19*
- Spoke on composting and utilization of compost to the Lyme Garden Club (42 attendees) *February 10*
- Gave a talk on composting and utilization of compost to the Haddam Garden Club (34 attendees) *February 11*
- Reported on Station research at a meeting of the State Technical Committee in Windsor (22 attendees) *February 18*
- Participated in a meeting of the Solid Waste Advisory Committee at DEP *February 24*
- Helped with Middle School Science Projects at Hamden Hall Country Day School (17students, 1 teacher) *March 5*
- Spoke on Composting and Utilization of compost to the Branford Garden Club (35 adults) *March 9*
- Was interviewed about the New Crops Program by Jan Spiegel of the New York Times *April 13*
- Spoke on the New Crops Program at Heritage Village in Southbury (42 attendees) *April 15*
- Was interviewed about the New Crops Program by Teresa Barger of the Hartford Courant *April 16*

- Assisted Hamden Hall Country Day School students with their science projects (9 student and 1 teacher participants) *April 16*
- Spoke on Unusual Vegetables to Grow in your Garden at the Station's Spring Open House (160 attendees) *April 23*
- Spoke on the New Crops Program as part of Earth Day activities at Sikorsky in Stratford (9 attendees) *April 29*
- Spoke on composting and the utilization of compost at the Old Ripton Garden Club in Shelton (35 attendees) *May 4*
- Evaluated students projects at Hamden Hall Country Day School (12 students) *May 21*
- Reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation in Windsor May 28
- Spoke about the New Crops Program to the Botany class at North Haven High School (21 students, 3 teachers) *May 20*
- Participated in a meeting of the Solid Waste Advisory Committee at DEP HQ in Hartford *June 23*

McHALE, NEIL A.

- Taught a mini course on "Factors Affecting Plant Growth" for the Federated Garden Clubs of CT *October 7, 2008*
- Presented a lecture on "Genetic Modification of Agricultural Plants" to the Western Chapter of the American Chemical Society in Bridgeport *October 21*
- Gave a talk "Domestication and Breeding of Crop Plants" to the Old Ripton Garden Club in Shelton *March 2, 2009*

MERVOSH, TODD

- Along with Dr. John Ahrens, spoke about new herbicides for Christmas trees under investigation at the Valley Laboratory and presented an informational display of weeds at the twilight meeting of the Connecticut Christmas Tree Growers Association (45 attendees from CT, MA, and RI) *July 10, 2008*
- Spoke about weed management at a twilight meeting of the Connecticut Christmas Tree Growers' Association in Glastonbury (50 attendees) *July 17*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (12 attendees) *July 24*
- Led the farm tour and presentations at a twilight meeting of the Connecticut Christmas Tree Growers' Association in Cheshire (35 attendees) *August 7*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (12 attendees) *August 18*
- Served as leader of a project to control the invasive plant Japanese knotweed along Salmon Brook as part of the United Way "Day of Caring" activities at Holcomb Farm in Granby *September 5*
- Participated in a symposium planning committee meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (10 attendees) *September 8*
- Was an instructor for four sessions at the Noxious & Invasive Vegetation Management Short Course sponsored by the Northeastern Weed Science Society at Mt. Gretna, PA (70 attendees) *September 15-17*
- Served on the Planning Committee, was a session moderator, and presented the talk "Research Projects: Management of Pale Swallow-wort and Japanese Stiltgrass" at the Invasive Plant Symposium at UConn in Storrs (400 attendees – 150 at the talk) *October 1*

- Spoke about weed control options at the fall meeting of the Connecticut Christmas Tree Growers' Association in Griswold (60 attendees) *October 4*
- Participated in a symposium follow-up meeting and a steering committee meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory in Windsor (12 attendees) *November 5*
- Participated in the Cooperative Agricultural Pest Survey (CAPS) committee meeting in Windsor (15 attendees) *November 13*
- Was an invited speaker on the subject of weed management in nursery fields at an ornamentals workshop (40 attendees) and spoke about his research on control of pale swallow-wort (30 attendees) at the annual meeting of the Northeastern Weed Science Society in Baltimore, MD *January 5-8, 2009*
- Reported on his pale swallow-wort control project on Mt. Tom at the Silvio O. Conte National Fish and Wildlife Refuge Office, Sunderland, MA (10 attendees) *January 16*
- Presented a research poster about herbicide impacts on pale swallow-wort and other vegetation at the Weed Science Society of America Conference in Orlando, FL (400 attendees) *February 9-12*
- Provided information at the Connecticut Invasive Plant Working Group display at the Connecticut Flower & Garden Show in Hartford *February 22*
- Was interviewed about a project to control invasive plants such as multiflora rose and garlic mustard in Bridgeport parks by Keila Torres of the Connecticut Post *March 3*
- Along with Rose Hiskes and Gregory Bugbee, was an instructor for a course on identification of invasive plants at CAES in New Haven (65 attendees) *March 5*
- Met with town officials in Newtown regarding control options for mile-a-minute vine *March 17*
- Met with representatives of UConn, DEP, and Spectra Energy Company about a biological control project for mile-a-minute vine in Quinnipiac River State Park in North Haven *March 23*
- Participated in meetings of the Connecticut Invasive Plant Working Group (35 attendees), the Mile-a-Minute Task Force (20 attendees), and the Connecticut Nurserymen's Foundation Scholarship Selection Committee (10 attendees) at the Valley Laboratory in Windsor *March 24*
- Spoke about integrated weed management and factors affecting herbicide activity at a training course for Suffolk County pesticide applicators in Yaphank, NY (20 attendees) *March 27*
- Served on the scholarship selection committee for the Connecticut Nurserymen's Foundation at a meeting at the Valley Laboratory in Windsor (15 Attendees) *April 7*
- Gave a presentation on "Identifying and managing weeds in gardens" at the Spring Open House at CAES in New Haven (142 attendees) *April 23*
- Spoke about mile-a-minute vine and other invasive plants at an Earth Day event at Sikorsky Corporate Headquarters in Stratford (12 attendees) *April 29*
- Presented a display about CAES and the Valley Laboratory at a career night at Suffield High School (50 student and 50 adult attendees) *April 29*
- Spoke about native and non-native invasive plants and assisted students and instructors from the Suffield High School Agriscience Program with a vegetation survey of a wooded property owned by the Suffield Land Conservancy (21 student and 3 adult attendees) *May 20*
- Arranged a display of non-native invasive plants and native ornamental plants for the Suffield Garden Club's flower show in Suffield (100 attendees) *June 5-6*
- Was interviewed about potential impact of the invasive mile-a-minute vine on Connecticut agriculture by Tom Moroney of Bloomberg.com News *June 12*
- Spoke about weed management at a twilight meeting of the Connecticut Christmas Tree Growers' Association in East Haddam (40 attendees) *June 17*

- Was interviewed about the plan to release weevils as biological control agents for mile-a-minute vine in Newtown by Kendra Bobowick of the Newtown Bee *June 22*
- Was interviewed about a plan to release biocontrol weevils for mile-a-minute vine in Greenwich by Frank MacEachern of the Greenwich Time newspaper *June 23 and 25*
- Hosted a meeting and led a walking tour of the Valley Laboratory property for Board members of the Suffield Land Conservancy (9 attendees) *June 25*

MOLAEI, GOUDARZ

- Presented an invited talk, "Epizootiology of eastern equine encephalitis virus in the northeastern United States: Lessons from the mosquito blood feeding behavior" at the annual Meeting of the Northeastern Mosquito Control Association, held in Providence, RI (100 attendees) *December 8, 2008*
- Discussed the Station's Mosquito Molecular Biology Research Program with officials from the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene *February 6, 2009*
- Was interviewed about research on molecular identification of blood meals from field-collected mosquitoes by Lauri Sanders, National Public Radio *June 24*

MUSANTE, CYNTHIA

- Gave a talk to a second grade Girl Scout troop about ticks *May 26*

NAIL, WILLIAM R.

- Participated in the annual meeting of the American Society for Enology and Viticulture – Eastern Section in St. Catharines, Ontario *July 14-16, 2008*
- Participated in a meeting of the ASEV-ES Board of Directors *July 16*
- Met with the vineyard manager and winemaker at Chamard Vineyards *September 15*
- Gave two presentations on new and existing cultivar trials to the Nursery and Landscape Research Tour at the Valley Laboratory (51 attendees) *September 16*
- Participated in a meeting of the State Consulting Committee for Agricultural Education at the Harris AgriScience and Technology Center at Bloomfield High School *September 23*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *October 30*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *November 3*
- Participated in the annual meeting of NE-1020: Multi-state Evaluation of Winegrape Cultivars and Clones in Palisade, CO *November 6-7*
- Participated in a meeting of the State Consulting Committee for Agricultural Education at Lebanon High School *November 20*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Connecticut Department of Agriculture in Hartford *December 11*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *January 5, 2009*
- Gave a demonstration workshop on pruning and renewing grapevines at Chamard Vineyards in Clinton (5 attendees*) January 13*
- Hosted and gave a tour of the Station to Dr. Carole Merideth, Professor Emeritas, University of California, Davis *January 15*

- Participated in a meeting of the State Consulting Committee for Agricultural Education at the Middletown Agriculture Science and Technology Center at Middletown High School *January 27*
- Gave a workshop on assessing and quantifying winter bud damage at a meeting of the Connecticut Vineyard and Winery Association in Farmington *February 2*
- Gave a presentation on pruning and tying grapevines at a meeting of the Connecticut Vineyard and Winery Association at the Connecticut Food Association in Farmington (14 attendees) *March 3*
- Participated in a planning meeting for an SCRI Project in Geneva, NY *March 5*
- Participated in the Finger Lakes Grape Growers' Conference in Waterloo, NY *March 6*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *March 19*
- Participated in a meeting of the State Consulting Committee for Agricultural Education at Wamogo High School in Litchfield *March 25*
- Participated in the annual National Viticulture Extension Educators meeting in Oklahoma City, OK March 31-*April 2*
- Participated in a meeting of the State Consulting Committee for Agricultural Education at the Agricultural Science and Technology Center at Glastonbury High School *May 26*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *June 11*
- Presented a poster presentation "Effects of Horticultural Oil on Carbon Assimilation and Fruit Set on Winegrapes" at the national American Society of Enology and Viticulture Meeting in Napa, CA *June 22-25*
- Served on the judging panel for the Student Oral and Poster Competition at the National American Society of Enology and Viticulture meeting in Napa, CA *June 22-25*

PETERSON, RICHARD B.

- Presented a poster entitled "LHCB7 Regulates Photoprotective Quenching and Linear Electron Transport", authored along with Dr. Neil Schultes, at the 26th Eastern Regional Photosynthesis Conference in Woods Hole, MA *April 17-19, 2009*
- Served as a judge for the competition project entries in the Connecticut Student Innovation Exposition held at the Connecticut Convention Center in Hartford (1600+ Middle and High School Student participants) *May 8-9*

PIGNATELLO, JOSEPH J.

- Participated in a workshop on Research and Development Needs for Understanding and Assessing the Bioavailability of Contaminants in Soils and Sediments sponsored by the DOD Strategic Environmental Research and Development Program and Environmental Security Technology Certification Program held at Annapolis, Maryland *August 20-21, 2008*
- Chaired a session and presented a poster "Attenuation of char surface activity over time by natural substances in soil" at a conference of the International Biochar Initiative: Biochar, Sustainability and Security in a Changing Climate, Newcastle, United Kingdom *September 8-10*
- Hosted Professor Robert Cook, Department of Chemistry, Louisiana State University, who gave a lecture and visited with staff *September 15*
- Chaired the business meeting of Division S-11 of the Soil Science Society of America, and presented the talk "Biochar as Soil Amendment: What Effect Will it Have on Chemical Availability?" at a symposium on Black Carbon in Soils and Sediments: CSSA-SSSA-GSA, Houston, TX *October 5-9*

- Gave the invited talk "Black carbon – its complex role as an adsorbent in the availability of organic chemicals in the environment" at the Yale Institute of Biospheric Studies *October 31*
- Presented an invited talk entitled "Attenuation of the Surface Activity of Chars by Natural Substances in Soil" at the 29th Annual Meeting of Society of Environmental Toxicology and Chemistry held in Tampa, FL *November 16-20*
- Gave the Station's progress report at the annual meeting of the W1082 Multistate Research Project *January 8-9, 2009*
- Presided over a meeting of the Biochar Planning Group to plan for submission of a multi-institutional grant proposal to the Biomass Research and Development Initiative Program (DOE and USDA), held at Cornell University *January 12*
- Gave the invited talk "Factors Affecting the Bioavailability of Contaminants in Soil and Sediment" at the workshop on Assessing Bioavailability as a Determinant of Pollutant Exposure, Superfund Basic Research Program in Tampa, Florida *February 19-23*

RATHIER, THOMAS M.

- Organized a Christmas tree twilight meeting and presented information on cultural and fertility management at the Valley Laboratory (45 attendees) *July 10, 2008*
- Helped man the Station' s booth and answered questions about tree care at the Connecticut Tree Protective Association's annual summer meeting in Farmington (several hundred attendees) *July 17*
- Organized the education portion of a twilight meeting for the Connecticut Christmas Tree Growers Association at the Rose Tree Farm in Glastonbury and presented information on cultural and fertility management (35 attendees) *July 17*
- Organized the education portion of a twilight meeting for the Connecticut Christmas Tree Growers Association at the Leavenworth Tree Farm in Cheshire (35 attendees) *August 7*
- Organized the annual Nursery and Landscape Research Tour at the Valley Laboratory and presented information on potting media physical characteristics (48 attendees) *September 16*
- Taught the Tree-Soil Relationships session for Arboriculture 101 in Jones Auditorium (45 attendees) *September 17*
- Taught a class on management of tree pests at the Tree Wardens School in Middlefield (20 attendees) *September 25*
- Organized the education portion of the Fall Field Meeting of the Connecticut Christmas Tree Growers Association at the Geer Farm in Griswold and presented cultural and fertility management updates (60 attendees) *October 4*
- Presented information of tree diseases at the tree conditions lab for Arboriculture 101 in Jones Auditorium (45 attendees) *October 29*
- Participated in a review session for Arboriculture 101 in Jones Auditorium (45 attendees) *December 3*
- Taught the Tree-Soil Relationships session for Arboriculture 101 in Jones Auditorium (45 attendees) *February 4, 2009*
- Spoke on Container Gardening at the Shoreline Institute for Lifelong Learning in Guilford (25 attendees) *March 5*
- Organized the education portion of the Annual Meeting of the Connecticut Christmas Tree Growers Association in Middletown. Also presented a pest management update (60 attendees) *March 7*
- Spoke on container gardening for the Garden Club of Orange in Orange (40 attendees) *April 14*
- Spoke on vegetable gardening at Revay's Gardens in East Windsor (20 attendees) *April 25*

- Organized the education portion of a twilight meeting for the Connecticut Christmas Tree Growers Association at the Staehly Tree Farm in East Haddam (35 attendees) *June 17*

REEPS, ROSLYN S.

- Gave an invasive aquatic plant identification workshop to residents of Lake Hayward in East Haddam (40 attendees) *July 19, 2008*
- Gave an invasive aquatic plant identification workshop to students at the Kellogg Environmental Center Wild Kids Program in Derby (10 attendees) *July 29*
- Presented a talk entitled "Identification of Invasive Aquatic Plants" at the 2008 Connecticut Invasive Plant Working Group Invasive Plant Symposium held at the University of Connecticut in Storrs (75 attendees) *October 1*
- Moderated a discussion session on *Hydrilla verticillata* (20 attendees) and presented a poster entitled "The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program" at the 2008 Connecticut Invasive Plant Working Group Invasive Plant Symposium held at the University of Connecticut in Storrs *October 1*
- Attended the GIS Council meeting in East Hartford as the Station's representative *October 22*
- Presented a talk entitled "Invasive Aquatic Plant Identification" to Post University students in Waterbury (15 attendees) *October 27*
- Presented a poster entitled "The Invasive Aquatic Plants of Lake Zoar for Connecticut GIS Day, held at Southern Connecticut State University in New Haven *November 19*
- Represented CAES at the Connecticut Geospatial Council meeting held at SCSU *November 19*
- Gave a talk about invasive aquatic plants and CAES Invasive Aquatic Plant Program to 6 Education Connection student groups *December 15*

RIDGE, GALE

- Was interviewed about ant behavior for the Community Television program *Expeditions New England July 1, 2008*
- Was interviewed about the Asian longhorned beetle by Nancy Burns of the Housatonic times Newspaper *September 17*
- Gave a lecture on bed bugs to the Connecticut Pest Control Association for their annual Fall seminar *September 30*
- Lectured on flies, both beneficial and harmful, their medical and epidemiological significance at the 69th Annual Eastern Conference of the National Pest Management Association at Foxwoods (290 attendees) *January 16, 2009*
- Spoke about insect morphology, ecology and adaptations for survival to the Talented and Gifted Program students from New Haven (30 students) *January 22*
- Lectured on insects of medical importance to man; lice, bed bugs, fleas, scabies, etc. to the Connecticut Department of Disabled Services for New Haven (27 attendees) *January 23*
- Lectured on the ecological history of the forests of the northeast, and how they have been historically impacted by man, at the winter conference of the Connecticut Grounds Keepers Association in Hartford (60 attendees) *January 29*
- Held the first of two Connecticut bed bug forums for health departments, pest control operators, housing authorities and other commercial interests. Participants learned about bed bugs, their control, and legal issues. They asked questions from an expert panel and discussed strategies on bed bug management (180 attendees) *March 17*

- Participated in an EPA Bed Bug Summit. Was leader of one of the working groups and addressed the delegates at the closing session of the conference, giving recommendations her group came up with. Participants came from all over the continent representing the pest management, hospitality and housing, management industries, health departments, academia, research, congressional representatives, flight attendant and pilot unions and government agencies including CDC, HUD, and USDA. Washington, D.C. *April 13-15*
- Was interviewed about the population decline of Connecticut bats and how this might affect agricultural crop pests by the Day newspaper *May 18*

ROBB, CHRISTINA S.

- Participated in the FDA FERN National Meeting in Denver, CO *July 29-31, 2008*
- Was a session organizer for the Eastern Analytical Symposium Session titled "Ensuring the Safety of the Food Supplies" held in Somerset, NJ *November 17-20*
- Gave a presentation titled " Global Analytical Chemistry" for 8th graders of the New Haven public school system held at Southern Connecticut State University in New Haven *March 26, 2009*
- Attended HILIC Day presented by Merck SeQuant as part of the American Society for Mass Spectrometry meeting in Philadelphia *May 31*

RUTLEDGE, CLAIRE

- Co-authored a talk "Predators on the Plantscape" that was presented at the XIII International Congress of Entomology, Durban, SA, July 11, 2008
- Taught the insects and trees sessions of CTPA Arboriculture 101 in Jones Auditorium (45 attendees) *October 8 and 29*
- Gave a talk entitled "Asian longhorned beetle, a big problem on our doorstep" to the annual meeting of the Environmental Industry Council in Framingham, CT (200 attendees) *November 23*
- Taught the insects and trees sessions of CTPA's Arboriculture 101 in Jones Auditorium (45 attendees) *December 3*
- Gave a talk entitled "Asian longhorned beetle: Worcester" to the NOFA Organic Land Care Update Course in Worcester, MA (180 attendees) *December 9*
- Co-authored a poster "Using Biosurveillance to Detect the Emerald Ash Borer in New York and New England" that was presented at the USDA Interagency Research Forum on Invasive Species, Annapolis, MD *January 12, 2009*
- Gave a talk entitled "Asian longhorned beetle, A big problem on our doorstep" to the John Deere Landscaping Winter Update Course in Meriden, CT (70 attendees) *January 14*
- Participated in the CTPA winter meeting in Farmington, CT *January 15*
- Gave a talk entitled "Asian longhorned beetle, A big problem on our doorstep" at the Connecticut Groundskeepers Association Turf and Landscape Conference, Hartford, CT (40 attendees) January 29
- Gave a talk entitled "What's bugging your trees?" sponsored by the Milford Tree Commission, Inc., at the Milford Public Library, Milford, CT (25 attendees) *January 31*
- Gave a lecture entitled "Asian Longhorned Beetle on our doorstep" at the Connecticut Parks Association Winter meeting in Jones Auditorium (25 attendees) *February 11*
- Taught the Insects and Trees portion of the Arobriculture Course presented by Bartlett Arboretum in Stamford, CT (17 attendees) *February 12*
- Gave a lecture entitled "Using a native wasp to find the Emerald Ash Borer" to the Forest Health Workshop, Jones Auditorium (40 attendees) *February 19*

- Taught class on “Insects that Attack Trees” to the CTPA Arboriculture 101 course, Jones Auditorium (45 attendees) *February 25*
- Presented a talk entitled “Male interrupted: Mating duration and sperm transfer in the emerald ash borer and its native congener the bronze birch borer” at the annual meeting of the Eastern Branch of the Entomological Society of America in Harrisburg, PA (40 attendees) *March 22*
- Participated in the Northeastern Bark Beetle and Woodborer Taxonomy Training sponsored by USDA APHIS and US Forest Service at the University of Massachusetts, Amherst *March 31*
- Presented the talk “Invasive species and changes in Connecticut’s forests” to the Environmental Studies School of the Federated Garden Club (40 attendees) *May 6*
- Gave a talk entitled “Using a native wasp to find the Emerald Ash Borer” to the Connecticut Entomological Society in Jones Auditorium (20 attendees) *May 15*
- Manned a booth on Asian Longhorned Beetle and Emerald Ash Borer at the Norwalk-Wilton Tree Festival in Norwalk, CT (approximately 1,000 festival attendees) *May 16*
- Presented the talk “The Emerald Ash Borer” at a USDA PPQ, CAES Forest Pest Outreach ‘Train the Trainer’ session at the Valley Laboratory (25 attendees) *May 19*

SANDREY, STEPHEN J.

- Setup and staffed an exhibit for the Station on tick/Lyme disease, Asian Longhorned Beetles, and Invasive Aquatic Plants at the 7th Annual “Celebrating Agriculture” at the Woodstock Fairgrounds, Woodstock (600 attendees) *September 20, 2008*
- Helped staff an exhibit and answer questions on Asian Longhorned Beetle and honey bees at the 27th Annual CT Flower & Garden Show held at the CT Convention Center in Hartford (20,000 visitors to the show) *February 21, 2009*

SCHULTES, NEIL P.

- Hosted laboratory tours and talked about “How to make a transgenic plant” to New Haven High School seniors attending Yale Summer Scholars Program (Science Collaborative for Hands-On Learning and Research) (10 attendees) *July 11, 2008*
- Served on a graduate thesis examination committee for Tyler Mansfield at Indiana Perdue University *September 25*
- Lectured on Plant Identification and Taxonomy to The Federated Garden Club of America Garden Study School at Jones Auditorium *October 7*
- Spoke on genetic research in photosynthesis to visiting scholars from China hosted by Dr. De-We Li *October 9*
- Served as the voting delegate for the Quinnipiac Chapter of Sigma Xi, and presented a poster “High glycolate oxidase activity is required for survival of maize in normal air” at the Annual Sigma Xi Conference in Washington D.C. *November 20-23*
- Hosted and gave a tour of the Station to Dr. Carole Merideth, Professor Emeritas, University of California, Davis January 15, 2009
- Hosted laboratory tours and talked about “Photosynthesis” to twenty five 4th grade students from the Talented and Gifted Program in New Haven *January 22*
- Served as a judge for forty-eight 7th grade science projects and poster presentations at the Adams Middle School in Guilford *February 3*
- With Dr. Richard Peterson, submitted a poster entitled “LHCB7 Regulates Photoprotective Quenching and Linear Electron Transport” at the 26th Annual Eastern Regional Photosynthesis Conference at the Marine Biological Laboratory, Woods Hole, MA *April 17-19*

- Visited a second grade class at the Guilford Lakes Elementary School in Guilford and spoke to the students about what a plant scientist does at work. He went over how seeds work and dissected different types of fruit to locate the seeds (22 students) *May 26*

SHEPARD, JOHN

- Spoke to students from St. Ann School in Bridgeport and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (18 student attendees) *November 20, 2008*
- Spoke to students from Career High School in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (28 attendees) *December 3*
- Presented a talk "Arbovirus Activity in Connecticut, 2008, at the Annual Meeting of the Northeastern Mosquito Control Association, held in Providence, RI (100 attendees) *December 8*
- Spoke to students from Career High School in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (25 attendees) *December 18*
- With Michael Thomas gave a tour of the Station's Mosquito Research Laboratories and described the procedures used for mosquito trapping and identification in the State Mosquito Trapping and Testing Program for officials of the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene *February 6, 2009*
- Spoke to students from the Metropolitan Business Academy in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program at Yale University (26 students) *March 31*
- Spoke to students from Walsh Middle School in Branford and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (14 students) *April 16*
- Presented a display on West Nile Virus and Mosquito Biology at the Biodiversity Day event, "Backyard Bloodsuckers: Biodiversity Bites Back!" held at the Peabody Museum, Yale University (678 attendees) *April 23*
- Was interviewed about procedures used in collection and identification of mosquitoes in the Experiment Station's Mosquito Trapping and Testing Program by Lauri Sanders, National Public Radio *June 24*
- Was interviewed about the Experiment Station's Mosquito and Arbovirus Surveillance and Research Programs by Lauri Sanders, National Public Radio *June 24*

SHORT, MICHAEL R.

- Assisted at the "Evening at the Greenhouse" meeting at Lockwood Farm presented by the Connecticut Greenhouse Growers Association *September 11*
- Discussed hydroponic greenhouses and ebb & flow greenhouses at Lockwood Farm with the freshman class of The Sound School (15 students) *September 21*
- Assisted with the Station's display at the CNLA-CGGA "Winter Symposium & Expo" in Wallingford *January 14, 2009*

SLETTEN, PAMELA

- Initiated contact with North Haven High school and arranged for a talk by Dr. Sandra L. Anagnostakis and herself on their chestnut research for the AP Biology class. They also planted 2

American and two Chinese chestnut trees on shool property and talked to the students about planting and growing the trees (17 students and 1 teacher attended) *May 8*

SMITH, HUGH

- Gave a presentation on IPM principles for Connecticut's Nurseries in Spanish at the CNLA Winter Symposium (50 attendees) *January 15, 2009*
- Gave a presentation entitled "Key Pests of Tobacco" at the annual Tobacco Research Meeting in Suffield (120 attendees) *February 17*
- Gave a presentation on management of arthropod pests of tobacco at the CPS tobacco meeting at the Clarion Suites, East Windsor (120 attendees) *April 15*
- Spoke about integrated pest management to the Open Spaces Committee of the town of Simsbury *June 3*

SMITH, VICTORIA L.

- Participated in an instructional Webinar on identification of Light Brown Apple Moth, conducted by the National identification Service (60 participants) *July 1, 2008*
- Was interviewed about defoliation of oaks by gypsy moth by Aaron Kupec of WTIC-Radio *July 17*
- Assisted USDA-APHIS-PPQ officers in a facility inspection of the USFS Insect Quarantine Facility in Ansonia, CT *July 18*
- Participated in a meeting of the Northeast Sustainable Agriculture Research and Education Administrative Council, as the representative of the Eastern Region Departments of Agriculture, held in Roanoke, West Virginia (40 participants) *July 20-24*
- Participated in a meeting of the National Cooperative Agricultural Pest Survey Committee, as the representative of the Eastern Plant Board, held at the USDA Professional Development Center in Frederick, Maryland (25 participants) *July 28-August 1*
- Participated in the National Plant Board Meeting, held in Solomons, MD (200 participants) *August 10-24*
- Traveled with the US Forest Service to Worcester, MA to see the recent infestation of Asian Longhorned Beetle (25 participants) *August 15*
- Participated in a twilight meeting of the Connecticut Greenhouse Growers Association, held at Lockwood Farm with a presentation titled "Chrysanthemum White Rust Update" (60 attendees) *September 11*
- Hosted a workshop for DEP Foresters and interested Station personnel on Asian Longhorned Beetle. Topics included how to recognize the insect, how to spot damage, and what to do if it is found (60 participants) *September 12*
- Hosted the Chrysanthemum White Rust Strike Team, a unit from USDA-APHIS-CPHST which visited Connecticut to assess risk of CWR and to investigate the recent outbreak *September 17*
- Participated in a meeting of the Connecticut Tree Wardens held at Connecticut College, with the presentation "Everything You Wanted to Know About Asian Longhorned Beetles" (60 participants) *September 24*
- Participated in a meeting of the Forest Health Cooperators, held in conjunction with the Northeast Area Field Office of the US Forest Service, at George Washington/Pulaski Management Area in Chepachet, RI, with reports on surveys for Asian Longhorned Beetle, Emerald Ash Borer, Sirex, *Phytophthora ramorum*, and other forest health matters (16 participants) *October 21-22*
- Presented a talk "Asian Longhorned Beetle: on Our Doorstep" to the Urban Forestry Council of CT (200 participants) *October 23*

- Participated in a meeting of Forest Health Cooperators, sponsored by US Forest Service Northeast Area Office, held at the George Washington/Pulaski Management Area, Chepachet, RI, and presented reports on *P. ramorum* aquatic survey, surveys for Asian Longhorned Beetle, Emerald Ash borer, Sirex Wood Wasp, and other exotic pests, and an aerial survey for Gypsy Moth and other defoliators (25 participants) *October 21-22*
- Presented the talk "Asian Longhorned Beetle: On Our Doorstep" at the CT Urban Forest Council meeting, held at Mountain Ridge Resort in Wallingford, CT (200 participants) *October 23*
- Participated in a meeting of the National Cooperative Agricultural Pest Survey as the Eastern Plant Board Representative, and participated in a State Plant Regulatory Official's meeting in response to the Asian Longhorned Beetle, Phoenix, AZ (approximately 200 participants) *December 3-4*
- Participated in the CT Nursery and Landscape Association Winter Symposium, held at Mountain Ridge Resort in Wallingford, with a talk titled "Asian Longhorned Beetle: On Our Doorstep" (60 participants) *January 14, 2009*
- Participated in the CT Tree Protective Association Winter Meeting held at Aqua Turf in Southington, with a talk titled "Asian Longhorned Beetle: On Our Doorstep" (800 participants) *January 15*
- Participated in the winter meeting of the National Cooperative Agricultural Pest Survey Committee as the representative of the Eastern Plant Board, held at Eastern Region USDA-APHIS-PPQ Headquarters in Raleigh, NC (30 participants) *January 21-22*
- Presented the talk "Asian Longhorned Beetle: What to Look For" at a meeting of the New Haven and Middlesex County Highway Associations, held at the Elks Club in Westbrook (40 participants) *January 27*
- Hosted and organized the Annual Forest Health Workshop, held in Jones Auditorium. Current results of surveys for forest pests and diseases were discussed and ten Station scientists presented research findings (35 attendees) *February 19*
- Participated in a meeting of the CT State CAPS Committee, to get an update on the Asian Longhorned Beetle Program, discuss and coordinate outreach efforts for the state, and discuss and coordinate any survey efforts, held at the Valley Lab (10 participants*) March 3*
- Participated in the Winter Meeting of the Northeast Sustainable Agriculture Research and Education Administrative Council, Burlington, VT (35 participants) *March 4-6*
- Participated in a meeting on firewood regulations held at the George Washington Wildlife Management Area in Chepachet, RI (10 participants) *March 13*
- Was the Keynote Speaker at the 17th Annual Meeting of the Tree Wardens Association of CT, and presented the talk "The Asian Longhorned Beetle: Update", Portland, CT (100 participants) *March 26*
- Presented annual reports on behalf of the National CAPS Committee and the National Plant Board *P. ramorum* Working Group at the 84th Annual Meeting of the Eastern Plant Board, Portland Maine *April 6-9*
- Gave a lecture to an Ecology Class at Eastern CT State University on Asian Longhorned Beetle and other invasive species (25 students) *April 15*
- Participated in a meeting on regional emergency planning and response, held at the USDA-APHIS-PPQ Office in Wallingford (8 participants) *April 17*
- Participated in the Twilight Meeting of the CT Pomological Society and gave a presentation on results of the survey for Light Brown Apple Moth (35 participants) *April 28*
- Participated in the Stakeholder Meeting for the 2008 Farm Bill Section 10201 as a representative of the National CAPS Committee, held at USDA-APHIS offices in Riverdale, MD (200 participants) *June 7-9*

- Participated in a Twilight Meeting of the Connecticut Pomological Society, held at Blue Hills Orchard in Wallingford, and presented information on export certification of apples (60 participants) *June 10*
- Participated in a briefing for Asian Longhorned Beetle Emergency Preparedness held at DEP Headquarters in Hartford (10 participants) *June 11*
- Hosted the National *Phytophthora ramorum* Quality Assurance Review Team, and led tours to production nurseries, a tour of laboratory facilities, discussions with nursery growers, and discussions on procedures (10 participants) *June 15-16*

STAFFORD, KIRBY C.

- Participated in the meeting of the Northeastern Regional Association of Experiment Station Directors (NERA) in Bethesda, MD *July 13-15, 2008*
- Reviewed progress on the CDC Cooperative Agreement with Dr. Joseph Piesman from the Centers for Disease Control *July 25*
- Was interviewed about gypsy moth activity and defoliation in Connecticut by Susan Haigh, an Associate Press writer *July 28*
- Was interviewed about Asian longhorned beetle in Worcester, MA by Abram Katz of the New Haven Register *August 14*
- Was interviewed about Asian longhorned beetles by Nancy Cohen of WNPR Radio *August 19*
- Was interviewed about Asian longhorned beetle by Maggie Perez of the Stamford Advocate *August 20*
- Was interviewed about survey for Asian longhorned beetles in northern Connecticut by Emily Grove of the Norwich Bulletin *August 28*
- Was interviewed about Asian longhorned beetles by Quannah Leonard of the Republican American in Waterbury *August 28*
- Was interviewed about Asian longhorned beetles by Tina DeTelj of WTNH Channel 8 *September 2*
- Was interviewed about Connecticut response to the discovery of Asian longhorned beetles in Worcester, MA by Scott Zoback, News Editor of Worcester Magazine *September 2*
- Spoke about Asian longhorned beetles and ticks on Representative Pamela Sawyer's cable access show in Bolton, CT *September 16*
- Was interviewed about Asian longhorned beetles by Heather Nann Collins of the Journal Inquirer, Manchester *September 22*
- Was interviewed about deer reductions, ticks, and Lyme disease by Robert Miller of the News Times, Danbury *September 24*
- Spoke on biological and natural tick control in a symposium on recent advances in tick-borne disease at the 40th annual Society for Vector Ecology Conference in Fort Collins, Colorado *September 29*
- Participated in a meeting of the Connecticut Entomological Society in Jones Auditorium *October17*
- Was interviewed about the tick season and adult tick activity by Meredith Blake of the Greenwich Times *October 20*
- Spoke on ticks and the Asian longhorned beetle at the Hadlyme Hall Garden Club in East Haddam, CT (30 attendees) *October 22*
- Participated in a bed bug workshop planning session organized by Dr. Gale Ridge with representatives from DEP, state and local health, and the pest control industry *October 24*
- Participated in a bed bug workshop planning session organized by Dr. Gale Ridge with representatives from DEP, state and local health officials, and the pest control industry *November 3*

- Spoke on the use of repellents, sprays, and treating pets for Lyme disease prevention at the Ridgefield Health Department's Lyme Disease Prevention Symposium in Ridgefield, CT (35 attendees) *November 5*
- Spoke on tick control and tick-associated diseases at Sessions Woods Conservation Education Center, Burlington, CT (50 attendees) *November 12*
- Participated in a CAPS committee meeting at the Valley Laboratory *November 13*
- Participated in a panel discussion on Lyme disease in Deep River, CT (63 attendes) *November 15*
- Participated in the annual meeting of the Working Lands Alliance in Hartford *November 19*
- Discussed research plans and training again at the fire school with Dr. Kimberly Stoner, at the Southern New England Beekeepers Assembly in Hamden *November 22*
- Was interviewed about deer and Lyme disease by Kendra Bobowick of the Newtown Bee *November 25*
- Participated in a technical meeting for Regional Project NE-1031 as Administrative Advisor, Raleigh, NC *December 12*
- Participated on an Asian longhorned beetle outreach conference call with USDA/APHIS/PPQ and regional state partners *January 9, 2009*
- Spoke on Plant Quarantine Process at the Connecticut Nursery and Landscape Association winter meeting in Wallingford (30 attendees) *January 15*
- Participated in a regional workshop to assess research and outreach needs in integrated pest management to reduce the incidence of tick-borne disease in the southern US at the Centers for Disease Control and Prevention in Atlanta, GA *January 21-23*
- Spoke on ticks and Lyme disease and the Asian longhorned beetle at the Orchard Valley Garden Club in Southington, CT (53 attendees) *January 27*
- Participated in the McIntire-Stennis Administrative Technical Representative meeting in Washington, D.C. *January 28*
- Spoke on Pest Management: Ticks and Lyme disease at the Organic Land Care Course in Jones Auditorium (67 attendees) *January 30*
- Participated in an Asian longhorned beetle meeting with USDA/APHIS/PPQ in Wallingford *February 18*
- Welcomed participants to the Forest Health Workshop in Jones Auditorium (35 attendees) *February 19*
- Spoke to FFA teachers touring the Station about the Department of Entomology research, service, and surveys, including Asian longhorned beetle *February 27*
- Participated in a meeting of the bed bug forum planning committee in the Slate Board Room (5 attendees) March 6
- Spoke on ticks and Lyme disease at the Bolton Center School in Bolton (50 attendees) *March 11*
- Welcomed attendees to the Connecticut Bed Bug Forum and CAES in Jones Auditorium (180 attendees) M*arch 17*
- Participated in the meeting of the Northeastern Regional Association of Agricultural Experiment Station Directors (NERA) in Baltimore, MD *March 23-25*
- Spoke on Connecticut Beekeeping at a meeting of the Connecticut Beekeeping Association in Jones Auditorium (67 attendees) *April 4*
- Spoke at the Monroe Public Library on ticks and Lyme disease (10 attendees) *April 7*
- Participated in an Asian longhorned beetle outreach planning group meeting at the Valley Laboratory *April 14*

- Spoke on ticks and Lyme disease and introduced the Asian longhorned beetle at Connecticut Light and Power in Middletown, CT (58 attendees) *April 16*
- Spoke on ticks and Lyme disease prevention at a meeting of the Connecticut Naturopathic Practitioners Association in Cromwell, CT (95 attendees) *April 18*
- Spoke on ticks and Lyme disease prevention at a Lyme disease conference at Norwalk Hospital in Norwalk, CT (118 attendees) *April 22*
- Spoke on ticks and Lyme disease as part of Representative John Stripp's Environmental Information Sessions in Weston, CT (14 attendees) *April 27*
- Participated in a meeting of the NIH/Peabody Museum Advisory Council at the Yale Peabody Museum in New Haven (9 attendees) *April 28*
- Spoke on ticks and Lyme disease and the Asian longhorned beetle at the White Memorial Conservation Center in Litchfield (33 attendees) *May 2*
- Spoke on ticks and Lyme disease and presented a poster on the Asian longhorned beetle at a meeting of the Connecticut Groundskeepers Association at Lockwood Farm (35 attendees) *May 4*
- Spoke on ticks and Lyme disease to members of the Nutmeg Chapter of the American Society of Safety Engineers (25 attendees) *May 6*
- Was interviewed about ticks and Lyme disease by Sam Gingerella, WTIC-Radio *May 7*
- Gave a presentation on Station history and an update to Experiment Station Associates in Jones Auditorium (58 attendees) *May 12*
- Spoke on ticks and Lyme disease to the Norwalk PTO Council at the Cranbury Elementary School in Norwalk (14 attendees) *May 18*
- Participated in a CAPS meeting in Windsor *June 2*
- Participated in affirmative action training in Hartford *June 5*
- Was interviewed about the effects of the weather on ticks by Elizabeth Sile of the Hartford Courant *June 15*
- Was interviewed about ticks and the weather by Mark Herz of WSHU-Radio *June 19*
- Spoke on poultry pest identification and IPM at the North Atlantic Poultry Biosecurity and Pest Management Workshop at the University of Connecticut in Storrs (40 attendees) *June 24*
- Spoke to student teachers from Southern Connecticut State University touring the Station about programs in the Department of Entomology (13 attendees) *June 30*
- Was interviewed about tick activity and Lyme disease by Mark Sims of Connecticut Radio Network *June 30*

STONER, KIMBERLY A.

- Participated in the annual meeting of NE-9, the annual meeting of the Technical Advisory Committee to the Plant Genetic Resource Unit of the USDA, Geneva, NY (9 attendees) *July 8, 2008*
- Participated in a meeting of the Board of Directors of CT NOFA, Berlin, CT (12 attendees) *July 20*
- Presented a workshop on "Threats to the Health of Bees" at the NOFA Summer Conference at the University of Massachusetts in Amherst (35 attendees) *August 9*
- Co-presented a workshop with Bryan O'Hara of Tobacco Road Farm on "Overwintering Greens" at the NOFA Summer Conference at the University of Massachusetts in Amherst (60 attendees) *August 10*
- Spoke on "Why Organic?" at the NOFA Massachusetts Organic Lawn and Turf Course at the University of Massachusetts at Dartmouth (60 attendees) *August 19*

- Spoke on “Why Organic?” at the NOFA Connecticut Organic Lawn and Turf Course at Manchester Community College (95 attendees) *August 20*
- Distributed information about vegetable insects and their management and about The Connecticut Agricultural Experiment Station at the Waterbury Farmers’ Market *August 28*
- Along with Dr. Brian Eitzer was interviewed about pesticides in honey bee pollen by Kevin Jacobsen of News 12 Connecticut *September 2*
- Participated in a policy and planning meeting of the Working Lands Alliance for Farmland Preservation in Hartford (30 attendees) *September 9*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory (8 attendees) *September 9*
- Participated in a meeting of the Board of Directors of CT NOFA at Roby’s Organic Farm, Berlin (13 attendees) *September 21*
- Spoke on “Starting an Organic Garden” and organized the educational event “Learn Today, Grow Tomorrow” at Boulder Knoll Farm in Cheshire (20 attendees) *September 28*
- Spoke about the Experiment Station’s research on honey bees to the Back Yard Beekeepers Association, Westport (65 attendees) *September 30*
- Presented the talk “Pesticides in Pollen Collected from Honey Bee Hives in Connecticut” at the Pollinator Conference: Information for Action, sponsored by the U.S. Fish and Wildlife Service and held at the University of Massachusetts in Amherst (100 attendees) *October 3*
- Presented the work of the Entomology Department, along with Dr. Gale Ridge and Ms. Elizabeth Alves, to three visiting Chinese government administrators *October 9*
- Chaired the meeting of the NOFA Organic Land Care Committee by conference call (8 participants) *October 16*
- Let a tour of Lockwood Farm for the New Haven Bioregional Group (15 attendees) *October 18*
- Participated in a meeting of the Board of Directors of CT NOFA, Berlin, CT (13 attendees) *October 19*
- Presented the talk “Alternatives to Insecticides for Managing Vegetable Insects” to the Naugatuck Valley Audubon Society at the Kellogg Environmental Center, Derby, CT (12 Attendees) *October 21*
- Presided over the annual meeting of a community farming group, the Friends of Boulder Knoll in Cheshire, CT (20 attendees) *October 23*
- Presented an on-farm workshop on Winter Growing along with Bryan O’Hara of Tobacco Road, sponsored by CT NOFA (36 attendees) *October 26*
- Spoke about her career as a scientist in a symposium on Women in Science at the Naugatuck Valley Community College in Waterbury (65 attendees) *October 28*
- Participated in the Harvest Celebration and Annual Meeting of CT NOFA at Jones Auditorium *November 1*
- Met with research associates of Brown University about identification of pollen samples *November 7*
- Made a presentation on “Getting the Food to Where the People are” with Bill Duesing of CT NOFA at the Smart Growth Conference *November 13*
- Chaired the annual retreat of the Organic Land Care Committee of NOFA at Mercy Center in Madison *November 14-16*
- Participated in the annual meeting of the Working Lands Alliance in Hartford *November 19*
- Gave the presentation “Why Organic?” at the NOFA Organic Lawn and Turf Course for Municipalities *November 20*
- Participated in a meeting of the Southern New England Bee Assembly in Hamden *November 22*

- Participated in a meeting of the Board of Directors of CT NOFA, Roby's Organic Farm, Berlin (12 attendees) *December 7*
- Participated in the annual retreat of the Board of Directors of CT NOFA at Lockwood Cottage (14 attendees) *January 3, 2009*
- Presented the talk "Measuring Pesticides in Pollen" co-authored with Brian Eitzer, at the Atlantic Coast Agricultural Conference in Atlantic City, NJ (50 attendees) *January 14*
- Made the presentation "Pest Management Overview" as a part of the NOFA Organic Land Care Accreditation Course in Leominster, MA (65 attendees) *January 16*
- Presented the talk "Managing Good Bugs and Bad Bugs in Vegetables" at the Getting Started in Organic Farming Conference, and hosted the conference in Jones Auditorium (45 attendees) *January 17*
- Participated in a meeting on possible revisions to the Connecticut School Pesticide Law at the Department of Environmental Protection in Hartford (18 attendees) *January 22*
- Made the presentation "Principles and Procedures in Organic Land Care" as part of the NOFA Organic Land Care Accreditation Course in New Haven (67 attendees) *January 27*
- Made the presentation "Pest Management Overview" as part of the NOFA Organic Land Care Accreditation Course in New Haven (67 attendees) *January 29*
- Co-authored a paper with Brian Eitzer. She presented the paper entitled "Measuring Pesticide in Pollen Trapped From Honey Bee Hives in Connecticut" at the American Bee Research Conference in Gainesville, FL *February 5*
- Participated in a meeting called by officials at the Watershed Partnership and the CT Department of Environmental Protection to consider modifications of the ban on pesticides at day care centers and school grounds of K-8 schools (12 attendees) *February 10*
- Presented the "Pest Management Overview" in the NOFA Organic Land Care Course in Providence, RI (51 attendees) *February 27*
- Spoke to the North Haven Garden Club on "Organic Gardening and Organic Pest Management" (40 attendees) *March 12*
- Participated in a meeting of the Board of Directors of CT NOFA in Oxford (12 attendees) *March 15*
- Participated in a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory, Windsor (6 attendees) *March 17*
- Along with Dr. Brian Eitzer and Ms. Vickie Bomba-Lewandoski, presented posters on honey bees and our research measuring pesticides in pollen at Ag Day at the Capitol *March 18*
- With Dr. Brian Eitzer, met with the Natural Resources Defense Council and other scientists on the role of pesticides in pollinator decline in Washington, DC (12 attendees) *March 24-25*
- Presented the talk "Biological Control and Organic Management of Vegetable Pests" to the Milford Community Gardeners at the Milford Senior Center (45 attendees) *March 30*
- With Dr. Brian Eitzer gave a talk on "Pesticide Residues in Pollen Collected by Foraging Honey Bees" to the Connecticut Beekeepers Association in New Haven *April 4*
- Participated in a course on "The Identification, Ecology, and Monitoring of Native Bees" presented by Sam Droege of the U.S. Fish and Wildlife Service at the National Conservation Training Center in Shepherdstown, West Virginia *May 4-8*
- Participated in a meeting of the Board of Directors of CT NOFA in Berlin (12 attendees) *May 17*
- Participated in a meeting of the Organic Land Care Committee of NOFA at the Valley Laboratory (7 attendees) *May 19*
- Made a presentation on organic management of insect pests and disease for FRESH New London at their community farm (25 attendees) *May 30*

- Presented a talk entitled “Threats to the health of wild bees and honey bees” to the annual meeting of the Hamden Land Trust (40 attendees) *June 17*
- Participated in a meeting to plan the “Tour des Farms” a bicycle tour of farms in Hamden, North Haven, and Cheshire, sponsored by the Green Expo/CT Folk Alliance (4 attendees) *June 23*
- Participated in a meeting of the Organic Land Care Committee of NOFA by conference call (8 participants) *June 24*

STUBER, HEIDI R.

- Assisted with displays and handed out materials for an exhibit at the GE Employee Safety Day held at their facility in Danbury *July 22, 2008*
- Participated in the Biodiversity Day event “Backyard Bloodsuckers: Biodiversity Bites Back!” by providing a display on ticks and Lyme Disease held at the Yale Peabody Museum of Natural History, New Haven (678 attendees) *April 17, 2009*

THOMAS, MICHAEL C.

- Led a nature walk at the Hartford Audubon Society Centennial Family Field Day Celebration at Northwest Park, Windsor (100 attendees) *October 5, 2008*
- Demonstrated mosquito rearing protocols at the University of Connecticut with a student working on an independent research project *October 13*
- Spoke to students from St. Ann School in Bridgeport and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (18 student attendees) *November 20*
- Spoke to students from Career High School in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (28 participants) *December 3*
- Spoke to students from Career High School in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (25 participants) *December 18*
- With John Shepard, gave a tour of the Station’s Mosquito Research Laboratories and described the procedures used for mosquito trapping and identification in the State Mosquito Trapping and Testing Program for officials of the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene *February 6, 2009*
- Spoke to students from the Metropolitan Business Academy in New Haven and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program at Yale University (26 students) *March 31*
- Spoke to students from Walsh Middle School in Branford and provided hands on activities about mosquito biology and arbovirus surveillance as part of the NIH/NSF sponsored Peabody Fellows Program, Yale University (14 students) *April 16*
- Presented a display on West Nile Virus and Mosquito Biology at the Biodiversity Day event, “Backyard Bloodsuckers: Biodiversity Bites Back!” held at the Peabody Museum, Yale University (678 attendees) *April 23*
- Participated in the 10th Anniversary of the Connecticut State BioBlitz held in the Greater Hartford Area (99 participating scientists) *June 12-13*
- Was interviewed about procedures used in collection and identification of mosquitoes in the Experiment Station’s Mosquito Trapping and Testing Program by Lauri Sanders of National Public Radio *June 24*

TRENCHARD, PETER

- Helped staff an exhibit and answer questions on Asian Longhorned Beetle and honey bees at the 27th Annual CT Flower & Garden Show held at the CT Convention Center in Hartford (20,000 visitors to the show) *February 19 and 21, 2009*
- Presented two talks "CWR Strikes Again" and "Traceback Troubles: Another *P. ramorum* Saga". For the HIS meeting at the 84th Annual Meeting of the Eastern Plant Board in Portland, Maine April 6-9

VOSSBRINCK, CHARLES

- Presented two lectures entitled "The Microsporidia, Phylogeny, Ecology, and Molecular Biology" to the Department of Sericulture at the South China Agricultural University in Guangzhou, China *April 28*
- Presented the lecture entitled "The Microsporidia, Phylogeny, Ecology, and Molecular Biology" to the Division of Microbiology, Institute of Sericulture and Systems Biology, Southwestern University in Chongqing, China *April 30*
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WARD, JEFFREY S.

- Participated in the Connecticut Urban Forest Council Meeting in New Haven *July 9, 2008*
- Participated in the Connecticut Tree Protective Association's annual meeting in Farmington *July 17*
- Spoke on forestry and horticultural research for TAG students from New Haven (32 student and 2 teacher participants) *July 18*
- Spoke on tree growth at Park City GIS Tree mapping Boot Camp in Bridgeport (12 student and 4 adult participants) *July 29*
- Was an invited guest on WTIC AM-1080 radio talk show "Garden Talk" to offer advice on barberry control *August 2*
- Was interviewed about lack of cherry fruits this year by Marian Fitzpatrick of the Stamford Advocate *August 29*
- Spoke on "Tree Biology" for the Arboriculture 101 class sponsored by the Connecticut Tree Protective Association in Jones Auditorium (49 attendees) *September 3*
- Was interviewed about swamp maples by Bob Miller of the Danbury News Times *September 5*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *September 9*
- Chaired a Connecticut Forest Council Research Committee meeting in Middlefield *September 11*
- Spoke on the "History of Connecticut's Forests" for two literature classes at Southern Connecticut State University (46 attendees) *September 15*
- Participated in the Connecticut Tree Protective Association's Education Committee Meeting in New Haven *September 16*
- Spoke on "Reducing browse damage in gardens" for the Naugatuck Valley Audubon Society in Derby (20 attendees) *September 16*
- Spoke on "Crop Tree Management" at the Fox Forest Workshop in Hillsborough, NH (50 attendees) *September 19*
- Participated in a Connecticut Forestlands Council Executive Board Meeting in Middlefield *September 23*

- Visited Quinnipiac State Park to advise Peter Picone, DEP Wildlife, on establishing conifers after invasive plant control *September 23*
- Spoke on "Japanese barberry control" at the Connecticut Invasive Plant Working Group Symposium in Storrs (150 attendees) *October 1*
- Spoke on "A Short History of the Connecticut Forest" for the Cherry Brook Garden Club in Canton (26 attendees) *October 14*
- Was interviewed about fall leaf color by John Burgeson of the Connecticut Post *October 14*
- Spoke on "Historic Changes at Gold's Pines" at the Annual Meeting of the Cornwall Conservation Trust (23 attendees) *October 19*
- Spoke on "Invasive shrub control" for the Clinton Land Trust in Clinton (37 attendees) *October 20*
- Spoke about the historical and future impacts of exotic insects and diseases in Connecticut's urban forests at the Connecticut Urban Forest Council's 20th Annual Conference in Wallingford (60 attendees) *October 23*
- Spoke on "Forestry and Wildlife" for students from the Coop High School, New Haven (5 student and 1 teacher attendees) *October 30*
- Discussed invasive species control options with officials from the Audubon Connecticut Bend of the River Wildlife Sanctuary *November 10*
- Spoke on "A short history of the Connecticut Forest" for the Branford Garden Club in Branford (17 attendees) November 10
- Along with Dr. Scott Williams and J. P. Barsky, visited with Parks Coordinator of Mansfield to advise on invasive shrub control *November 13*
- Met with Greenwich Town officials to discuss invasive shrub control *November 14*
- Participated in the Connecticut Urban Forest Council meeting in Middlefield *November 19*
- Spoke on "Connecticut Highlands Ecosystem Health Project" at the 4th Annual Connecticut Forest Conservation and Research Forum in Storrs (45 attendees) *November 25*
- Participated in a Future of CT Forests Symposium Planning Committee Meeting at Yale University *December 10*
- Was interviewed by Keila Torres of the Connecticut Post about the lack of acorns *December 16*
- Was interviewed about longevity of Kwansan cherries by Wendy Carlson of the New York Times *December 22*
- Was interviewed about Japanese barberry control by Jean Stowe of The Plantsman (UK) *January 4, 2009*
- Participated in the 87th Annual Meeting of the Connecticut Tree Protective Association in Plainville *January 15*
- Participated in the Connecticut Urban Forest Council Meeting in Middlefield *January 21*
- Spoke on "Tree Biology" for the Arboriculture 101 class sponsored by the Connecticut Tree Protective Association, in Jones Auditorium (49 students) *January 21*
- Spoke on forestry and wildlife research for the New Haven Talented and Gifted Program (16 students) *January 22*
- Was interviewed about status of mountain laurel in Connecticut by Brigitte Ruthman of the Waterbury Republican *February 3*
- Participated in a meeting of the Connecticut Tree Protection Examining Board to revise the oral examination *February 11*
- Spoke on "Barberry control alternatives" at the 14th annual Forest Health Monitoring Workshop in Jones Auditorium (33 attendees) *February 11*

- Participated in a Connecticut Forestlands Council – Executive Board meeting in Middlefield *February 24*
- Spoke on forestry and horticultural research for Future Farmers of America teachers (8 teachers) *February 27*
- Participated in a Connecticut Forestlands Council, Research Committee meeting in Middlefield *March 4*
- Administered a practical and oral examination to arborist candidates for the Connecticut Tree Protection Examining Board *March 11*
- Spoke on "Controlling Japanese barberry: alternative control methods" at the New England Society of American Foresters meeting in Portland, ME (35 attendees) *March 18*
- Spoke on "Invasive control strategies: theory and practice" at the "30 Hour Course", a pesticide applicators certification course sponsored by the Cornell University Cooperative Extension, Yaphank, NY (15 attendees) *March 26*
- With J. P. Barsky, conducted a field workshop on controlling invasive shrubs for officials from Bridgeport (6 attendees) *April 1*
- Spoke on "Alternative methods of controlling Japanese Barberry and impact on Lyme disease" at the Yale Forest Forum (30 attendees) *April 2*
- Was interviewed about the health of Connecticut's urban forest by Ed Stannard of the New Haven Register *April 16*
- Conducted a field workshop on controlling invasive shrubs for trail master of the Sleeping Giant Association in Hamden (7 attendees) *April 18*
- Was interviewed about barberry and ticks by Ann Bertini of the Connecticut Academy of Science and Engineering *May 1*
- Spoke on "Effectiveness of deer repellents" to the Connecticut Groundskeepers Association in Hamden (30 attendees) *May 4*
- Spoke on"Trees and their use in the landscape" for the Federated Garden Clubs of Connecticut (25 attendees) *May 6*
- Spoke on"How plants grow" for the Calvin Hill Kindergarten in New Haven (20 students, 5 teachers) *May 8*
- Was interviewed about trees and pollen by Judy Benson of the New London Day *May 11*
- Attended a Management Advisory Council meeting in Newington *May 20*
- Along with Dr. Scott Williams and Mr. Joseph Barsky, attended Yankee Division-Society of American Foresters field meeting at Yale Myers Forest in Eastford *May 29*
- Gave six talks on "Fruits of the forests" at the Southington School Nature Day in Southington (120 student and 20 adult attendees) *June 4*
- Gave three talks on "Crop tree management" at the American Forestry Past & Present – a 2009 Connecticut Trails Day Event in Chaplin (5 child and 35 adult participants) *June 7*
- Spoke on "Forest Forensics" for Middletown 7th graders in Middlefield (60 student and 4 teacher participants) *June 8*
- Administered practical and oral examination to arborist candidates for the Connecticut Tree Protection Examining Board *June 10*
- Participated in the NESAF Silvicultural Working Group Summer 2009 Field Trip at Yale-Myers Forest in Union *June 26*
- Spoke on current resarch in the Department of Forestry & Horticulture to teachers from SCSU (12 teachers) *June 30*

WHITE, JASON C.

- Discussed current experiments on phytoremediation and the biological control of Eurasian Watermilfoil with Professor Genearo Frumento of Southern CT State University and 20 of his students at Lockwood Farm *July 10, 2008*
- Hosted Michael Petrillo, an undergraduate at Muhlenberg College in Allentown PA. He assisted on field experiments investigating the phytoremediation of legacy pesticides *July 14-18*
- Carried out a site visit at Barnum Court in Danbury, CT where efforts are being made to eliminate genetically modified cottonwood volunteers that were temporarily planted on the site to investigate mercury phytoremediation *July 29*
- Discussed collaborative experiments on ozone toxicity to plants with Dr. Julia Kuzovkina of UConn and Dr. William Manning of UMass *August 7*
- Met with Mark Mankin of Mankin Farms in New Milford and a high school student to advise them on a project they are undertaking to create a powdery mildew resistant edible pumpkin through traditional crossing techniques *August 21*
- Discussed his research and mutual research interests with Dr. Robert Cook of Louisiana State University *September 15*
- Presented a seminar at the New Hampshire Department of Agriculture entitled "Controlling Invasive Aquatic Weeds in Connecticut Lakes". The conference was held by the State FIFRA Issues Research and Evaluation Group (SFIREG) and involves regional EPA and NE state agriculture agency representatives (20 attendees) *October 16*
- Chaired the Phytoremediation session at the 24th Annual International Conference on contaminated Soils, Sediments and Water held at the University of Massachusetts, Amherst (30 attendees) *October 22*
- Participated in an EPA-sponsored conference call to begin planning of the next International Phytotechnology Society meeting *November 6*
- Hosted an undergraduate student from Muhlenberg College who conducted experiments under his supervision *January 5-9, 2009*
- Participated in an EPA-sponsored conference call to discuss the December 2009 International Phytotechnology Society Meeting; Dr. White is Vice President of the Society *April 9*
- Presented a lecture entitled "Phytoremediation of Soils Contaminated with Persistent Organic Pollutants" at the University of Connecticut's Department of Civil and Environmental Engineering weekly seminar series *April 17*
- Presented a poster entitled "Phytoremediation of soils contaminated with persistent organic pollutants" for the Earth Day Celebration held at Sikorsky Corp, Stratford *April 22*
- Met with two professors from Hubei Provincial Academy of Forestry in China and discussed phytoremediation research *May 26*
- Presented a poster "Assay-dependent phytotoxicity of nanoparticles to plants" at the Environmental Implications and applications of Nanotechnology conference" held at the University of Massachusetts, Amherst June 10
- Began mentoring a junior at Sacred Heart High School in Hamden. The mentoring program is coordinated by the Sacred Heart High School Summer Internship Program and consists of a minimum of 80 hours of mentoring time *June 22*

WILLIAMS, SCOTT C.

- Gave an invited talk "Overabundant Suburban White-Tailed Deer as Seed Dispersal Agents" at the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut in Storrs (60 attendees) *October 1, 2008*

- Gave a lecture and demonstration on small rodent capture, handling, and sera collection to the Wildlife Techniques class in the Department of Natural Resources Management and Engineering at the University of Connecticut, Storrs (15 attendees) *October 8*
- Gave a lecture and demonstration on "Large mammal capture techniques" to the Wildlife Sampling Techniques Class of the Department of Natural Resources Management and Engineering of the University of Connecticut, Storrs (15 attendees) *November 5*
- With J. P. Barsky, hosted a forestry tools and forest disease demonstration table at the Connecticut FFA Forestry Fall Career Development Event at UConn, Storrs (30 students from 19 Vo-Ag schools) *November 7*
- Discussed deer browse damage with the Director of Audubon Connecticut Bent of the River Wildlife Sanctuary *November 10*
- Hosted a table at the University of Connecticut College of Agriculture and Natural Resources Annual Career Night (350 students) *November 12*
- Met with Greenwich town officials to discuss white-tailed deer research *November 14*
- Participated in the Connecticut Urban Forest Council Meeting in Middlefield *November 19*
- Presented a research poster titled "Connecticut Deer Vehicle Collisions" at GIS Day at Southern Connecticut State University *November 19*
- Presented preliminary research results of the response of forest vegetation to exclusion from browsing deer over 3 growing seasons to the Stewardship Committee of The Nature Conservancy's Burnham Brook Preserve in East Haddam (15 attendees) *December 8*
- Presented a research poster on "Effectiveness of Deer Repellents on Yews in Connecticut" at the annual Winter Meeting of the Connecticut Nursery and Landscape Association in Wallingford (200+ attendees) *January 21, 2009*
- Participated in the Connecticut Urban Forest Council meeting, Middlefield, CT *January 21*
- Gave an invited lecture "Wildlife Laws and Deer Damage Avoidance" at the 8th Annual NOFA Course in Organic Land Care in Jones Auditorium (70 attendees) *February 1*
- With Joseph Barsky, met with officials from the Greenwich Council of the Boy Scouts of America about white-tailed deer research and future educational outreach opportunities *February 13*
- Gave a lecture titled "Even More Ticked Off about Japanese Barberry" at the Forest Health Monitoring Workshop in Jones auditorium (35 attendees) *February 19*
- Gave an invited lecture titled "Wildlife Laws and Deer Damage Avoidance" at the 8th Annual NOFA Course in Organic Land Care in Schodack, NY (30 attendees) *February 20*
- Gave an invited lecture titled "White Tailed Deer as Seed Dispersal Agents" at Science Day 2009 at Housatonic Valley Regional High School in Falls Village, CT (70 student and 20 faculty and visitor attendees) *February 26*
- Was interviewed about his research project investigating deer behavior proximate to roadways in the interest of better understanding the causes of deer-vehicle collisions by Meredith Blake of the Greenwich Times *March 2*
- Spoke on "Japanese Barberry: A Public Health Concern?" at Tupper Hill-Norcross Wildlife Sanctuary in Wales, MA (47 attendees) *March 7*
- Spoke on "Overabundant Suburban White-Tailed Deer as Seed Dispersal Agents" at Tuper Hill-Norcross Wildlife Sanctuary in Wales, MA (47 attendees) *March 7*
- Lectured on "Japanese Barberry: A Public Health Concern?" at the 3rd Annual Connecticut Conference on Natural Resources at the University of Connecticut, Storrs (52 attendees) *March 9*
- Spoke about white-tailed deer densities in Connecticut and their adverse impacts on the forested landscape to the Town of Fairfield's Conservation Commission (22 attendees) *March 25*

- Spoke on “Deer Repellents, Duration and Efficacy” at the “30 Hour Course”, a pesticide applicators’ certification course sponsored by the Cornell University Cooperative Extension, Yaphank, NY (41 attendees) *March 26*
- Presented a research paper titled “Usage of a GPS-Ready Digital Aerial Sketch Mapper for Conducting Aerial Snow Counts of Deer” at the 65th Annual Northeast Fish and Wildlife Conference, Lancaster PA (55 Attendees) *April 28*
- Lectured at the Town of Fairfield Conservation Committee meeting on the impacts of overabundant deer on forested ecosystems (20 attendees) *May 4*
- Participated in the Connecticut Urban Forest Council meeting in New Haven *May 20*

ADVANCES IN KNOWLEDGE

DEPARTMENT OF ANALYTICAL CHEMISTRY

The format adopted in the previous year's Record will be continued in order to focus succinctly on the Department of Analytical Chemistry, and its work, over the twelve months from July 2008 through June 2009. Narratives will be brief and salient issues presented in bulleted outlines. Sources of more detailed information are provided, when available. Hopefully, this revised format will provide information more conveniently and, therefore, be of more use to the Record's readers.

STAFF

Dr. MaryJane Incorvia Mattina,
Dr. Brian D. Eitzer
Dr. Walter J. Krol
Dr. Xiaolin Li
Dr. Christina S. Robb
Terri Arsenault
William Berger
Craig Musante
Mamie Pyles
John Ranciato

FOCUS AREAS

Service, research, and outreach activities 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 across a very wide range of sample matrices submitted to the Department of Analytical Chemistry by other departments at The Station, 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 CONNECTICUT DEPARTMENT OF AGRICULTURE

1. Animal Feeds:

- Analysts: Craig Musante, Mamie Pyles, John Ranciato
- Goal: assure products are in compliance with stated label guarantees.
- Analyses which served as the rationale for Station's establishment in 1875.
- Products for both household pets and commercial agricultural operations included.
- Samples collected by inspectors from the Connecticut Department of Agriculture.
- Analytical results reported to Connecticut Department of Agriculture, product manufacturer, product dealer.
- From 1 July 2008 to 30 June 2009 completed analysis of 115 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 26 (22.6%).

2. Fertilizers:

- Craig Musante, Mamie Pyles, John Ranciato
- Goal: assure products are in compliance with stated label guarantees.
- Analyses serving as basis of Station's establishment in 1875.
- Products for both residential and commercial agricultural operations included.
- Samples collected by inspectors from the Connecticut Department of Agriculture.
- Analytical results reported to Connecticut Department of Agriculture, product manufacturer, product dealer.
- 1 July 2008 to 30 June 2009 completed analysis of 120 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 36 (30.0%).

IMPACT: Analytical Chemistry has an established reputation within the State of Connecticut, as well as among federal agencies such as the Food and Drug Administration, for accurate and rapid chemical analysis of products for and from agriculture. Our staff demonstrates on an on-going basis its capability to expand beyond routine service analyses and provide non-routine analyses of the broadest range of matrices for a wide spectrum of analytes, accomplished within severe time constraints.

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

1. Pesticide residues in food:

- Analysts: Walter Krol, 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 established tolerances.
- Market basket survey samples collected by Inspector Ellen Sloan of the Connecticut Department of Consumer Protection.

- Results published in annual Station bulletin available by mail and at www.ct.gov/caes.
- From July 1, 2008 through June 30, 2009, 204 samples of fresh (154; 75.5%) and processed (50; 25.5%) fruits (102), vegetables (91) and other (13 total: olive oil (8); cereal (3)) samples were analyzed for pesticide residues.
- Beginning 1 January 2006 all market basket samples were analyzed using the QuEChERS method, providing lower limits of detection and increased number of detectable agrochemicals. Please see the Record of the Year 2006-2007, 2007-2008, and the RESEARCH section below, and Station bulletins for details.
- Results: of the 204 samples analyzed in July 1, 2008 - June 30, 2009, 120 samples (72.1%) contained a total of 420 residues. The average residue found was 0.098 ppm, and the average number of pesticide residues found on each sample was 2.86 in 2008 - 2009. The impact on the pesticide residue program of fully implementing QuEChERS in our laboratory is shown graphically in Figure 1 below. Note that both the number of residues observed and the proportion of samples with residues have dramatically increased. At the same time the average residue concentration has decreased by a factor of 10. This is because the new technique allows for the detection of many more pesticides than the old procedure and can detect those pesticides at much lower concentrations than the older procedure. Together these factors decrease the average reported concentration while increasing the number of residues, number of samples with residues present and number of violations due to the finding of residues where there is no tolerance allowed.

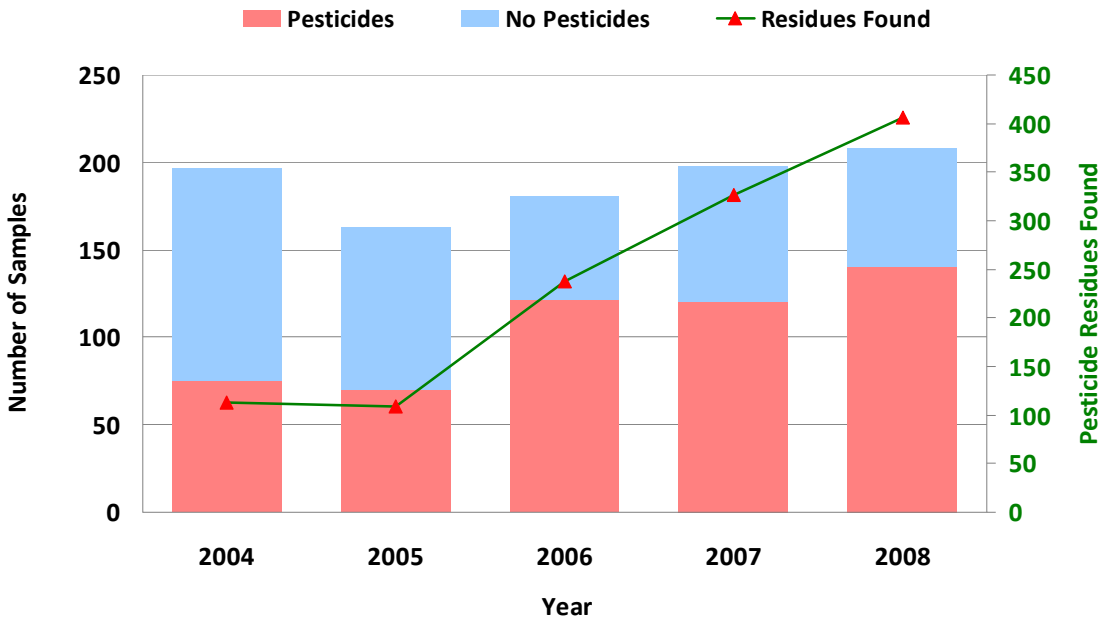


Figure 1. Pesticide Residue Data 2004 -2008

- Data highlights: a total of 60 different pesticide active ingredients were detected and quantitated. Of the 204 samples analyzed, 57 (27.9%) contained no detectable pesticide residues; 147 (72.1%) samples contained 420 pesticide residues. Of these 147 samples, 16 samples (7.8 % of total number of samples) contained residues which had no tolerance on the commodities to which they were applied and were therefore violative.

2. Melamine, pesticides, and toxins in food products.

- Analysts: Terri Arsenault, William Berger, Walter Krol, Brian Eitzer, Christina Robb and Craig Musante
- Goal: determine if melamine, or other pesticides or toxins were present in food products being sold in the State of Connecticut.
- Food products were collected by inspectors for the Connecticut Department of Consumer Protection and the Connecticut Department of Agriculture.
- From July 1, 2008 to June 30, 2009 a total of 102 food products were analyzed for melamine and its analogs. Of these 35 were cookies, cakes, or candies, 29 were drinks or drink powders, 22 were egg or egg products, 8 were dried cereals, and 8 were miscellaneous products. Of the total of 102 samples 5 were demonstrated to have melamine. Two products of which were eventually recalled. Additional melamine testing in foods was performed as part of a surveillance exercise for the Food Emergency Response Network.
- All of the food products were also analyzed for pesticide residues, metals and other toxins. Pesticide residues were analyzed using the QuEChERS extraction protocol used in the market basket survey. During the analysis of these samples five imported cereal samples were found to contain illegal residues of the insecticide pirimiphos methyl at levels ranging between 0.002 and 0.052 ppm, with an average level of 0.036 ppm. Samples of these cereals are shown in the photos below.

Figure 2. Cereals shown to contain pirimiphos methyl.

These results of these analyses were forwarded to the CT DCP in November of 2008. The DCP forwarded the results of these analyses to the Food and Drug Administration (FDA). In the Enforcement report of April 15, 2009, the FDA issued a national recall of 4553 cases of these cereal products.

IMPACT: Analyses conducted by the analytical chemistry department are important in public safety. The results of their analyses are reported in a timely fashion and can lead to the recall of products that have levels of chemical residues deemed unacceptable by regulatory agencies.

3. Fat content in ground meat

- Analyst: Craig Musante
- Goal: ascertain that percentage fat is consistent with product label
- From 1 July 2008 to 30 June 2009, 94 samples have been submitted and analyzed, of these 74 have been consistent with label claims.

3. Miscellaneous samples

- Analyst: department staff
- From 1 July 2008 to 30 June 2009, 206 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. Included with these were 4 samples of dietary supplements that were analyzed for the presence of anabolic steroids.

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 91 products such as beers, wines, liquors for ethanol

2. Herbal products for undeclared ethanol content

- Analyst: John Ranciato
- Goal: determine if herbal drinks contain ethanol at levels of concern.
- During the past year the Department of Liquor control became concerned that some herbal drink products that were being sold in an unregulated status had ethanol as a constituent. From July 1, 2008 through June 30 of 2009 a total of 51 of these products were analyzed for undeclared alcohol content. Of these samples, 39 had ethanol concentrations above the allowable amount (0.5%) for non-alcoholic beverages.

3. Beverage authenticity

- Analyst: Brian Eitzer
- Goal: Determine if products offered to customers at Connecticut establishments are authentic as to brand.
- Five alcoholic products examined for authenticity; none of the products was determined as unauthentic.

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

1. Lead in Toys

- Analyst: Craig Musante
- From July 1, 2008 to June 30, 2009 analyzed 12 samples such as crayons and toys for lead content.
- None of the items had lead over acceptable limits

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

1. Analysis of PCBs (polychlorinated biphenyls)

- Analysts: Brian Eitzer, William Berger
- Goals: ascertain extent of PCB contamination
- Matrices include, but are not limited to soils, waters, oils, sediments, surface wipes.
- From July 1, 2008 to June 30, 2009 a total of 42 samples were analyzed

2. Analysis of pesticides

- Analysts: Brian Eitzer, Terri Arsenault, Christina Robb
- Goals: ascertain pesticide concentration associated with misapplication or drift in support of Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Enhance the ability to analyze for polar pesticides using LC-MS/MS.
- Matrices include, but are not limited to soils, waters, oils, sediments, surface wipes.
- Water, vegetation and soil samples are now routinely analyzed for glyphosate using liquid chromatography/mass spectrometry (LC/MS). The developed analytical procedure has been requested by other laboratories
- Highlighted samples: In July of 2008, The CT Department of Environmental Protection was informed that a landscaper advertising pesticide free services was possibly using chemical pesticides. An inspector began her investigation with an interview and found that the homeowner had received lawn care services, in addition to deer repellent. Following the pesticide free application, the homeowner noticed a powdery white residue on the foliage that seemed suspicious. Through further questioning, the inspector was eventually able to collect 74 samples from 16 different properties, of which 52 contained pesticide residues. Pesticides found in the samples include herbicides (dithiopyr, benefin, trifluralin and pendimethalin, 2,4-D, 2,4-DP, prodiamine, quniclorac, glyphosate and bromacil); insecticides (imidacloprid, trichorfon, diazinon, chlorpyrifos and permethrin); a fungicide (thiophanate-methyl) and a fungicide/deer repellent (thiram). Eventually the inspector was able to gain access to the landscaper's apartment and collect two samples, one of red liquid in a "tip-n-pour" bottle, and a second of

yellow granules from the garage. The liquid sample contained a mixture of the herbicides dicamba, bentazon, 2,4-D, MCPA, 2,4-DP and MCPP. The granules contained the herbicides pendimethalin, dithiopyr, benefin and trifluralin. This investigation is still ongoing.

IMPACT: Rapid and accurate reporting of chemicals in the environment can be critical to clean-up and health issues. Our scientists have been able to provide analytical results to the appropriate staff at Connecticut Department of Environmental Protection to assure the safety of sites accessible to the public.

Analyses on behalf of MUNICIPAL and FEDERAL AGENCIES

1. Analysis on behalf of a Yale Hospital medical toxicologist

- Analysts: Brian Eitzer, Christina Robb
- Patient had intentionally ingested a Cambodian pesticide known as "slang nut". Patient appeared to be showing symptoms of strychnine and carbamate poisoning.
- A coarse brown seed/nut material was delivered by the doctor. An internet search allowed us to find a report indicating that "slang-nut" is a common name for nux-vomica, and this plant is a natural source of strychnine. Analysis of the sample showed that the sample contained strychnine, brucine and two pesticides one of which was a carbamate.

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

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Craig Musante, Christina Robb
- The Analytical Chemistry department has a Cooperative Agreement with the United States Food and Drug Administration to conduct research and analyses related to chemical contaminants in food. As part of that agreement the Analytical Chemistry department has successfully participated in performance tests and surveillance exercises for various chemical contaminants.

Analyses on behalf of other STATION DEPARTMENTS

1. Soils from Valley Laboratory, Soil & Water, and others including some community gardens

- Analysts: Craig Musante, John Ranciato
- From July 1, 2008 through June 30, 2009 a total of 29 soils from various sites across Connecticut were analyzed for heavy metal content. Concentrations of arsenic, cadmium, chromium, copper, nickel, lead and zinc were determined in all samples and compared to residential guidance criteria. Of these 29 soils three exceeded the residential guidance criteria for lead.

IMPACT: Knowledge of the heavy metal content of soils can be used to guide remedial action to help minimize public exposure to these metals.

2. 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 developed for low level detection of pesticides. See Research section below.

3. Analyses of samples for nootkatone

- Analyst: Terri Arsenault for the Department of Entomology
- See Research/Natural products section below for details

ANALYSES OF CHECK SAMPLES

- Analysts: Walter Krol, Terri Arsenault, William Berger, Christina Robb, Brian, Eitzer, Craig Musante,
- Annual performance evaluation samples required by our certifying agency, Connecticut Department of Public Health.
- Annual proficiency testing samples related to FERN work.

RESEARCH ACTIVITIES

Research projects in the Department of Analytical Chemistry include applied and fundamental studies. Research is often stimulated by our service work and in turn, research results often impact service activities.

I. FOOD SAFETY

- Project: *Comparison of two Methods for Determination of Pesticide Residues in Food*
- Investigators: Terri Arsenault, Brian Eitzer, Walter Krol
- Summary: An extensive comparison of our previous extraction method, the VegPrep, with the Quick, Easy, Cheap, Effective, Rugged, Safe (QuEChERS) method has been completed. In summary, the QuEChERS method can detect more pesticides at lower concentrations. A publication on this comparison will be forthcoming.

- Project: *Improvement to FERN methods*
- Investigators: Christina Robb
- Summary: Integral to our Cooperative Agreement with the FDA is assessment of various FERN procedures for detecting toxins in foods. This year we have been looking at the plant phyto-toxins. One of these toxins is Abrin, a toxin that is present in the seeds of *Abrus precatorius* (or Rosary pea). The seeds are red colored with a black dot at one end. Due to the eye-catching nature of the beads the seeds are often incorporated into jewellery and instruments. We have been working on methods for the detection of this compound both by using enzyme linked immunosorbent assays and for the detection of a related biomarker by LC/MS.

Figure 3. Photograph of the Rosary Pea

- Project: *Issues associated with ortho-phenyl phenol in paper products in contact with food*
- Investigator: Walter Krol

Summary: Last year (see 2008 Record of the Year) we demonstrated that the fungicides *ortho*-Phenyl phenol (OPP) and its sodium salt *ortho*-phenyl phenate can be found in some types of paper bags. In addition these compounds were shown to migrate from the paper bag to crops put into those bags causing contamination of those crops with pesticides that were not registered for use on them. This work will be reported on further in a future publication.

II. ENVIRONMENTAL MONITORING

- Project: *2009 Study of Crumb Rubber Derived from Recycled Tires*
- Investigators: William Berger, Xiaolin Li, MaryJane Incorvia Mattina, Craig Musante
- Introduction: As a part of a broad, State of Connecticut-funded study of several aspects of artificial turf fields, including components such as crumb rubber infill, the Department of Analytical Chemistry at the Station was charged with conducting a number of laboratory-based studies. In particular we are going to: (1) Develop protocols to identify comprehensively substances which volatilize and leach from crumb rubber and alternative infill materials under laboratory conditions. (2) Develop simulated crumb rubber aging protocols.
- During the period of March-May 2009, study funds were used to purchase a Combipal autosampler for our Varian 4000MS GC/MS system. This equipment permits the automated analysis of samples by a variety of methods, including solvent injection, solid phase microextraction (SPME), and headspace. SPME protocols were developed for the identification of volatile organic compounds released by the crumb rubber material (CRM). Protocols for the analysis of heavy metal compounds are also under development. In June of 2009, our study-supported post-doctoral research associate, Xiaolin Li, joined the team. From that time through the present, work has continued on the development of leaching methods and aging protocols, as

well as the analysis of study-provided CRM and alternative infill material samples for organic and inorganic components. This includes a headspace sampling method for the quantitative analysis of organic compounds volatilizing from the CRM. This work is ongoing and will be reported on in more detail in the future.

- Project : *Analysis of Polar Pesticides*
- Investigators: Christina Robb
- Summary: We are developing method enhancements to our procedures for the analysis of polar pesticides. These procedures include a new LC-MS/MS protocol for the direct analysis of paraquat/diquat in water. These compounds cannot be retained by typical reverse phase liquid chromatographic (RPLC) conditions. We are examining the use of a novel Hydrophobic Interaction Liquid Chromatography (HILIC) stationary phase based chromatographic column in this work. HILIC is a combination of a polar stationary phase that is used in conjunction with a semi-aqueous mobile phase. This combination makes an extremely mass spectrometry friendly system, and typically by changing from suitable RPLC conditions to HILIC conditions a substantial increase in sensitivity is observed. This work is currently ongoing.
- The LC-MS/MS method for glyphosate is now in routine use. This method has been shared with several other laboratories that are conducting similar analyses.

- Project: *Mechanisms of Uptake by Terrestrial Plants of Legacy Pesticides from Soil*
- Investigators: MaryJane Incorvia Mattina, William Berger
- Introduction: This project illustrates 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 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 a 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 *C. pepo*? We are not the only laboratory to report that *Cucurbita 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 that we conducted in the past demonstrated that root physiology is the foundation of *C.* pepo's unique phytoaccumulation properties.
- Laboratory methods to investigate *C. pepo* uptake of pollutants: Uptake by squash of organochlorine compounds must be opportunistic since there are no nutritional needs for these substances in the plant. We have hypothesized that these substances "piggyback" on genetically-based root physiology evolved for moving nutrients from *ex planta* regions across the root barrier to *in planta* regions. Our previous experiments have eliminated root exudation of organic acids as one possible nutritional pathway. We then hypothesized that water channels in the membranes of root cells, known as aquaporins, might be an avenue of entry into the cell for POPs. These root pores are known to transport a variety of small solutes, such as borate into the plant. We proposed that if plants were deprived of boron they might overexpress aquaporins and enhance uptake of POPs into the cell. Work performed in our labs in 2008, however, excluded boron nutrition as a significant controller of POPs uptake. However, these studies allowed us to establish a viable semi-hydroponic method for the growth of *C. pepo*. This system permits us to control the nutritional state of the plants, as well as collect xylem sap.

- Another way of examining what takes place in the aquaporin channels is to cause the channels to shut down by the addition of a chemical. Addition of hydrogen peroxide (H_2O_2) to the growth solution would generate hydroxyl radicals (*OH), which have been shown to close the aquaporin channels in other plant systems. Therefore, a decrease in chlordane uptake by the plants exposed to H_2O_2 would support the concept that aquaporins are a major pathway for chlordane to enter the roots of *C. pepo*. During the past year, we performed this experiment growing *C. pepo*. in a hydroponic solution with or without added H_2O_2. Preliminary results do in fact show a significant decrease in chlordane uptake for plants exposed to H_2O_2.

- Project: *Comparison of Metal Analysis Techniques in Community Garden Soils*
- Investigators: Craig Musante, John Ranciato
- The Department of Analytical Chemistry at CAES has a long history of assisting area community groups in the evaluation of urban soils intended for use in community gardens for heavy metals. The analysis of soils at a proposed community garden site in Waterbury, Connecticut revealed that the soils contained high levels of soil contaminants such as arsenic, chromium, and lead. These analyses resulted in substantial changes to the proposed Community Garden construction plan. The unique nature of this site created an opportunity for CAES to partner with the US EPA (Region 1) and the city of Waterbury to further evaluate the site and conduct a research study in which two methods of analysis for the determination of heavy metals in contaminated soils will be compared. Representative soil samples were obtained at depths of 3, 6, and 12 inches below the surface at ten locations within the research plot, generating thirty soil samples. These samples were split and analyzed by both CAES and the EPA. Samples were analyzed at the CAES using acid digestion with Inductively Conductive Plasma with Atomic Emission Spectroscopy. The US EPA analyzed these same soils with a method utilizing X-ray fluorescence. The data from these two procedures will be compared in a future publication.

- Project : *Analysis of Pesticides in Connecticut Pollen - Baseline Survey*
- Investigators: *Brian Eitzer and Kim Stoner (Dept. of Entomology)*
- Summary: We are conducting research into how honey bees get exposed to pesticides through their foraging activities. A honey bee can travel up to two miles away from its hive as it collects pollen. It brings the pollen back to the hive for use as a food. During this time the honey bee can be exposed to any pesticides used in the residential or agricultural fields from which it collects. Although all pesticides can potentially stress the honey bees, there is a particular interest in a new class of pesticides known as the neonicotinoids, as one member of that class (imidacloprid) has shown significant honey bee toxicity and has been banned in several countries. Our study is aimed at determining the current typical background exposure of honey bees to pesticides. We are collecting pollen from a set of honey bee hives that represent urban, suburban and rural locations. The pollen is being collected from the same location for a period of several years allowing us to look at time trends within the data. The pollen is brought to the laboratory where it is analyzed using a multi-pesticide screening technique that we have developed. The method is based on the QuEChERS procedures used in our fruits and vegetables residue work, but has had several small modifications to enhance the utility for pollen analysis. Over the past two years we have found at least one pesticide residue in every sample of pollen analyzed, and an average of 5 pesticides per sample. The most commonly detected compound, coumaphos, is an acaracide used by beekeepers to control *Varroa* mites. As none of the monitored hives has been treated during the study this is a good indication that residues of this

compound remain in the hive long after use. Other compounds found include insecticides, herbicides, and fungicides.

Figure 4. Honey bee collecting pollen

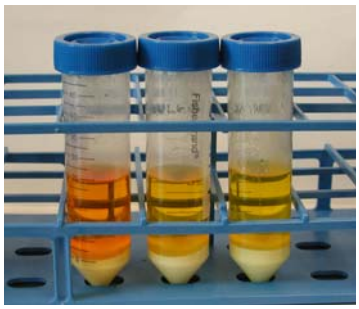


Figure 5. Pollen extracts ready for analysis

- Project : *Analysis of Neonicotinoid Pesticides in Flowers, Pollen and Nectar*
- Investigators: *Brian Eitzer and Kim Stoner (Dept. of Entomology), Dr. Frank Drummond*, (University of Maine) *Dr. Anne Averill*, (University of Massachusetts)
- This is a new two year project that we are participating in along with collaborators at other research institutions. We are interested in learning how much of a systemic pesticide applied as a part of a normal agricultural practice will be found in the pollen of the plant when it blooms. To conduct the study, we are growing crops of summer squash, cranberries and blueberries. Within each crop several different pesticide treatments were used. These treatments include seed treatments and foliar sprays used as directed. When the crop was in bloom, samples of the pollen and/or flowers were taken and brought to the laboratory for pesticide residue analysis. These analyses are conducted using the QuEChERS extraction procedures followed by LC/MS/MS. These analyses are currently ongoing and will be reported on in future publications.

- Project: Coordinated Agricultural Program on Honey Bee Health
- Investigators: Brian Eitzer and *Dr. Keith Delaplane* (University of Georgia, Lead Principal Investigator)
- This is a very large multi-institutional project (over 20 funded investigators from 15 different institutions) that is looking at issues related to the health of honey bees and other native pollinators. These issues relate to various pathogens (colony collapse disorder, *Nosema*, *Varroa* mites, etc.) and management practices. One of the threats to honey bees is use of pesticides in agricultural settings as well as within the beekeeping community. The role of the Connecticut Agricultural Experiment Station within this project is the analysis of pesticide residues. These residues will be examined as part of several separate research projects included within the overall project. Pesticide residues will be examined in pollen taken from sentinel apiaries (apiaries maintained by University researchers) on a monthly basis so that pesticide exposure can be examined as co-factor in studies on honey bee health. A second project will look at pollen and wax from commercial beekeepers. These studies are just beginning and will continue for the next several years.

- Project: Pesticides in Honey
- Investigators: Brian Eitzer and *Dr. Nancy Ostiguy* (Pennsylvania State University)
- A set of 38 honey samples were examined for pesticide residues. These samples included honey samples that were frozen and archived between 1995 and 2001 as well as samples of brood comb honey and overwintered honey from 2007 to 2008. All of the samples were analyzed using the QuEChERS procedures described previously. Residues of six different pesticides were observed in these samples. The two most commonly seen residues were for the acaracides coumaphos (present in 24 samples) and fluvalinate (present in 7 samples). These two chemicals were only observed in the more recent samples of honey. This is because these chemicals were registered for use by beekeepers to control mites within the hive in the time period between the archived samples and the recent samples. The observed concentrations of these two compounds were within the allowable tolerance. Other residues were only observed infrequently at low concentrations.

- III. NATURAL PRODUCTS
- Project: *Analyses of samples for nootkatone*
- Analyst: Terri Arsenault, Drs. Kirby Stafford and Anuja Bharadwaj (Department of Entomology)
- The effectiveness of nootkatone, an essential oil of grapefruit and other plants, for control of the deer tick (Ixodes scapularis), the primary vector for Lyme disease, is being investigated.
- In year one (2008), applications were made at six different sites at two levels of active ingredient (twelve sites total) to track the degradation of nootkatone. Filter paper samples were laid prior to the application, then collected immediately and over a two to three week time period. Initial data showed more than 90% of the nootkatone had degraded within two weeks of the application.
- In year two (2009), the goal was to develop a formulation that would be more persistent in the environment and thereby give better long term control. Preliminary research under controlled conditions in the laboratory, showed a formulation containing lignin would prevent the degradation of nootkatone by UV light. However, field data suggested the nootkatone would still break down rapidly in the environment. In June of 2009, we had unusually rainy weather, and this contributed to the break down of the filter paper, therefore method development work is continuing. In addition, this year, we showed that nootkatone can be extracted from and detected in both soil and foliage samples taken from the application sites.

PUBLIC OUTREACH

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. 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 Public School Science Fair: This past year Walter Krol served as judge for this well established science fair.

Town of Bethany - Conservation Commission: Dr. Brian Eitzer serves on the conservation commission for the Town of Bethany.

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

Protecting Honey bee hives from American Foulbrood Disease:

Dr. Douglas W. Dingman, assisted part-time by Cindy Musante, continued investigations on the bacterium *Paenibacillus larvae*: causative agent of the disease American foulbrood (AFB) in larvae of honey bees (*Apis mellifera*). DNA sequence analysis of the intergenic transcribed spacer (ITS) regions *of P. larvae* is being performed in part to develop an identification procedure using ITS-PCR. Complete sequences for three of the six different ITS regions present in *P. larvae* have been obtained and are undergoing comparative analysis. Genomic fingerprinting using restriction enzyme digestion profiles and PFGE continues to demonstrate only three phylogenic types of *P. larvae* in Connecticut. From seventy-five isolates that have been tested, *P. larvae* type Ib has been the most prevalent at 61%. *P. larvae* types I and Ib currently show an even geographical distribution across Connecticut. Distribution of *P. larvae* type III has been limited to the southwestern part of the state. REP-PCR, a phylogenetic typing method, has been started in an effort to correlate REP-PCR phylogenic types to PFGE phylogenic types. REP-PCR typing of *P. larvae* predominates in current scientific publications but has problems of lower reproducibility and limited strain resolution when compared to PFGE typing. Continued collaboration with Mr. Ira Kettle (Connecticut state bee inspector) to characterize the presence of AFB in Connecticut has, over 1.5 years, obtained bee samples from 73 apiaries comprising 243 beehives. Of these beehives, 11 (4.5%) have been visually diagnosed to have AFB. Microbiological analysis has shown 88 to have "sub-clinical" cases of AFB. At present, 41% of the beehives (encompassing 49% of the apiaries) tested in Connecticut have AFB infections to varying degrees. Testing of P. larvae isolates for resistance to the antibiotic Terramycin (used by beekeepers to control AFB) has identified five apiaries with resistant strains. All Terramycin resistant strains have been grouped into *P. larvae* type Ib and were geographically distributed into the western half of the state. A pilot study to investigate development of a sanitation protocol for combating AFB has progressed to testing under "real world" conditions. Three beekeepers have volunteered use of beehives that had been previously diagnosed with sub-clinical AFB. These hives were sanitized by the shake method of brood removal and use of a hydrogen peroxide/peroxyacetic acid compound to inactivate *P. larvae* spores. All beehives are being monitored for *P. larvae* spore levels over the course of a bee season.

Inverse PCR of *Paenibacillus popilliae* genomic DNA has extended the sequence reads for the previously identified heat shock protein and type-IV secretory genes. Also, shotgun PCR amplification of genomic DNA has identified four more genes in *P. popilliae* (i.e., a transposase, serine/threonine phosphatase, erythromycin esterase, and a collagenase). In collaborative research with Dr. Richard Cowles to develop a simple protocol to control white grub infestations using locally isolated strains of *P. popilliae*, in vivo production of *P. popilliae* spores has been

performed. Small samples of spores from several *P. popilliae* strains have been frozen for future work in field infectivity studies.

Impact

American foulbrood, a devastating disease to beekeepers worldwide, has been shown to be a significant presence within Connecticut beehives. Beekeepers have been informed of this prevalence. Also, beekeepers have been notified that Terramycin resistant *P. larvae* has been isolated from several different apiaries in Connecticut. Investigation of the sanitation procedure, to minimize or eradicate the spores (i.e., disease) from infected hives, has provided insight into efficient ways to help control this disease without complete reliance on antibiotic therapy.

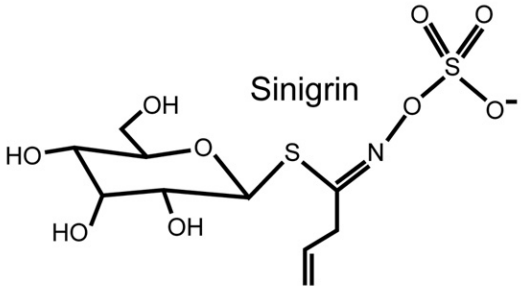
This study provides molecular biological information that future investigators can use in studies of *P. popilliae*. These future studies may result in the use of this bacterium as an alternative to the current practice of applying synthetically-derived pesticides for control of white grub infestations in turf.

Genetic Manipulation of Glucosinolate Levels in *Brassica*

Dr. Neil McHale continued work on the biochemistry and genetics of glucosinolates (GSLs) in Brassica species as a biological approach to suppression of soil-borne nematodes. The project is a collaborative effort involving Dr. Ross Koning (Eastern CT State University) and Dr. James LaMondia (Windsor Valley Lab). GSLs are derived from simple amino acids and by themselves have no biological activity, but when tissue is damaged by insect feeding, they come in contact with specialized enzymes called myrosinases that cleave the glucose moiety from the core molecule. This results in spontaneous rearrangements leading to formation of nitriles and isothiocyanates with biological activities against nematodes and a wide range of other pests. Genes controlling biosynthesis, side-chain modification and ultimate breakdown profile of GSLs are now available as tools for manipulation of this complex pathway, allowing us to engineer specific GSL profiles targeted to specific pest populations. Our primary target is the Northern root knot nematode *Meloidogyne hapla*. To determine which GSLs are most toxic to root knot nematodes, Dr. LaMondia devised a bioassay where ground plant tissue is mixed with sterilized soil and presented at different concentrations to nematodes in small test vials. Nematode survival is scored after a 48 hour incubation at room temperature. Candidate Brassica species for the bioassays were ranked for GSL type and quantity by Dr. McHale using a combination of DEAE Sephadex chromatography and HPLC assays based on absorption of UV light at 229nm. What these assays revealed is that seeds contain the highest levels of GSLs in all species tested, and that each species had a characteristic profile consisting of one predominant GSL as follows: *Brassica napus* "Dwarf Essex" (progoitrin), *Brassica juncea* (sinigrin), *Brassica oleracea* (4-methylsulfinylbutyl), *Crambe abyssinica* (epiprogoitrin), *Eruca sativa* (4-methylthiobutyl) and *Sinapis alba* (sinalbin). Bioassays were performed with ground seeds of these species, along with lettuce seeds as a no GSL control. The lowest lethality scores were observed in *S. alba* and *E. sativa* treatments. LD_{50} values were greater than 1.25 g per L soil, similar to the *L. sativa* control, suggesting relatively low toxicity for sinalbin and 4-methylthiobutyl GSL. Higher toxicity was observed in the Crambe treatments (60% mortality at 1.25 g/L soil), where

epiprogoitrin predominates. The highest toxicity levels (LD_{50} less than1.25 g per L soil) were observed with *B. juncea* Pacific Gold (100% mortality at 1.25 g/L), where sinigrin is the predominant GSL. The results point to *B. juncea* as the most promising species for management of *M. hapla* populations by biofumigation, and this species is now our primary target for genetic manipulation.

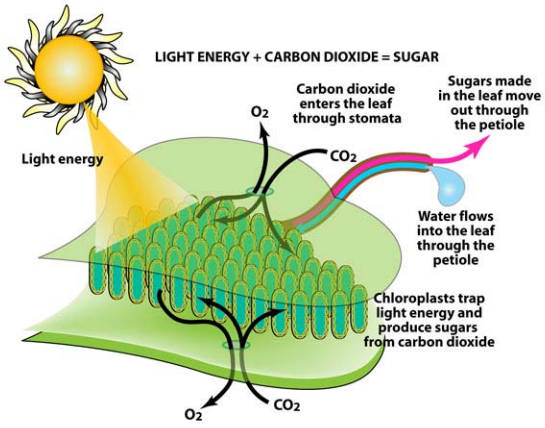
Impact



Our immediate aim is to improve agricultural sustainability in the Northeast with a biological alternative to chemical pesticides. The stakeholders in this are the farmers, as costs associated with chemical fumigation can approach $500 per acre. Farm workers would also benefit immediately from reduced pesticide exposure. The broader impacts will extend well beyond this, however, to all U.S. citizens residing in proximity to agricultural operations. Non-chemical pest control strategies will be critical to maintenance of water quality and human health in these regions.

Genetic Dissection of Photosynthetic Performance in Leaves

Dr. Richard Peterson in collaboration with **Dr. Neil Schultes** and assisted by Carol Clark engaged in studies intended to identify genes that control the rate of photosynthesis. This process is the primary means for accumulation of dry matter by plants and improving photosynthetic performance is widely considered to be a strategy for increasing crop yields. It is clear that the full potential of photosynthetic carbon fixation is seldom, if ever, realized in leaves even under optimal conditions. Instead, feedback regulatory processes that are incompletely understood downregulate photosynthesis when light availability is high. To a large extent this is a result of induction of nonphotochemical quenching leading to increased thermal dissipation of light energy. This results in lower photosynthetic quantum yields and mitigated growth. A better understanding of the genetic and physiological bases for photosynthetic regulation could lead to successful engineering of large increases in photosynthetic capacity into crop species.



Regulation by the LHCB7 gene. Leaf photosynthetic properties were compared in wild type *Arabidopsis thaliana* and a line containing a T-DNA insertion in the nuclear *LHCB7* gene. The latter encodes a polypeptide that is homologous to Photosystem II (PS II) antenna pigment proteins. Leaf pigment contents were largely unaffected by the mutation and no significant genotypic effect on levels of other LHCB proteins (LHCB1-6) or psbS was apparent. Chlorophyll fluorescence measurements indicated that the maximum PS II quantum yield was

unaffected by loss of LHCB7 expression. However, irradiance thresholds for development of nonphotochemical quenching and ΔpH-dependent downregulation of electron transport (photosynthetic control) were significantly lower for the mutant. Simultaneous assessments of linear electron transport rates based on fluorescence and CO_2 exchange failed to detect a *LHCB7*-dependent difference in allocation of linear electron flow to processes distinct from assimilatory carbon metabolism. This work adds to a growing consensus that the aggregate rate of electron flow to alternate acceptors *in vivo* is small and susceptible to methodological bias. Nevertheless, minute shifts in electron allocation can have significant effects on the transthylakoid ΔpH.

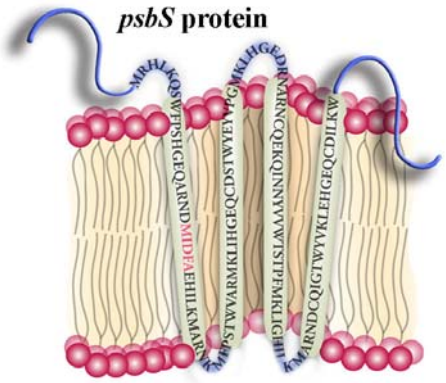
The search for genes underlying C_4 photosynthesis. Plants like *Zea mays* with the C_4 pathway of carbon fixation generally have faster growth and higher economic yields due higher photosynthetic capacities and improved water use efficiency. Dr. Thomas Brutnell and colleagues at The Boyce Thompson Institute (BTI) have correlated C_4 photosynthesis with changing patterns of gene expression along the axis of seedling leaves in maize. As a complement to this effort, we have begun examination of photosynthetic gradients along this longitudinal profile in a search for occurrence of C_3-like photosynthesis leading to eventual assignment of genes essential for expression of the C_4 syndrome. Efforts to date have concentrated on the O_2-dependence of the CO_2 compensation point, a robust indicator of photorespiratory capacity. Positive evidence for limited photorespiration has been detected in a zone near the base of the developing leaf. However, this capacity is lost as development and greening proceeds. A related approach involves screening of highly inbred Nested Association Mapping maize lines obtained from BTI. So far, no apparent differences in photorespiratory capacity have been noted for these lines when measurements were conducted approximately midway along the leaf profile. Nevertheless, intriguing O_2-dependent *increases* in net photosynthesis and conductance for CO_2 diffusion through the mesophyll tissue have been observed. These phenomena appear to vary somewhat among the lines tested. An interesting hypothesis arising from these effects of O_2 is that a small rate of photorespiration may be essential for concentration of CO_2 in bundle sheath cells, a key attribute of the C_4 photosynthetic mechanism.

Impact

The main impact of this work will be development of crop plants with higher photosynthetic capacity and able to withstand environmental stress. When water supply is limiting, for example, the photosynthetic apparatus can be damaged irreparably by continuous exposure to sunlight. Genes under investigation here contribute to protection from photodamage. 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, Dr. Harry Frank of the Department of Chemistry, University of Connecticut, and Dr. Thomas Brutnell, Boyce Thompson Institute.

Photo-protective Mechanisms in Plants

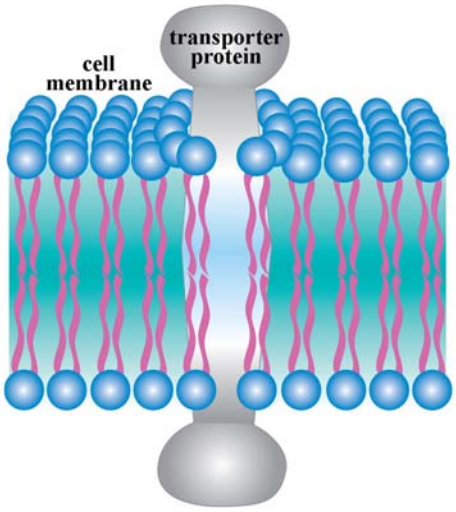
Dr. Neil Schultes continued his collaboration with **Dr. Richard Peterson** and assisted by Carol Clark and Regan Huntley, on light utilization and photo-protection in plants. During photosynthesis, plants transform energy from sunlight into chemical energy as sugars and starch. Adverse environmental conditions, particularly water deficit, result in physiological stress in plants that diminish photosynthesis and reduce yield. When photosynthesis is curtailed, continued absorbtion of light can lead to damage. Plants have evolved several ways to dissipate excess light energy, one of which involves the psbS protein in the thylakoid membrane of the chloroplast. To elucidate the mechanistic role of psbS, we have introduced a variety of mutations in the gene and reinserted the altered version back into plants. Identification of functionally important domains of the protein was guided partly by a phylogenic analysis of the psbS in higher plants, and by analysis of transgenic carrying wild-type psbS genes from Nicotiana (a C3 plant), Mesembryanthemum (a CAM plant) and the moss Physcomitrella. In each case the NPQ function was regained suggesting that among higher plants the psbS is interchangeable. A phylogenic analysis of other photosystem II associated genes reveals that Lhcb3 and Lhcb6 appear coincident with land plants but are absent among Chlorophytes. Data supporting the possibility that Lhcb3 and Lhcb6 proteins interact with psbS to form NPQ in higher plants lead us to conjecture that the high level of psbS sequence similarity is tied to the emergence of either Lhcb3 or Lhcb6. To investigate this hypothesis we are isolating *psbS* genes from the freshwater algae (Charales) that are the evolutionary sisters of land plants.



We are creating a collection of modified Arabidopsis psbS proteins that will allow us to follow the psbS protein *in planta*, probe regions of the psbS proteins for functional plasticity and assist in immunoprecipitation studies aimed at discovering interacting proteins. We have chosen to target three hydrophilic regions of the Arabidopsis psbS protein for tagging with small affinity epitopes and a tandem affinity purification (TAPa) tag and to test the modified psbS proteins for stability and function *in planta*. To date we have generated psbS forms with the 6X-Histidine tag at the mature C- and N-terminus; the HA epitope at the N-terminus and in the hydrophilic stromal loop region of the psbS protein. Transgenic Arabidopsis *npq4-1* lines expressing these variants reveal that all psbS forms are expressed and accumulate in membrane tissue and that tags at the C- and N-termini function, restore NPQ. Disruption of the hydrophilic stromal loop results in no NPQ function but the presence of a stable protein. Currently we are generating a C-terminal tagged psbS that will include a longer TAP tag to initiate immunoprecipitation studies.

Plant Nucleobase Transporters

Work also continued on a collaborative project with Dr. George Mourad at the University of Indiana/Purdue involving genetic and biochemical studies on transport of purines and pyrimidines in plants. Membrane bound transporters act as metabolite-specific gatekeepers that regulate traffic of metabolites between compartments. These transporters are often key control points in plant biochemistry. Therefore understanding how plant transporters function is an important goal for eventual enhancement of crop productivity. Our research centers on two different transporter families in Arabidopsis - the adenine/guanine-like transporter (AtAzgA) and purine related transporter (PRT) families. Two Arabidopsis loci, At3g10960 and At5g50300, encode proteins that share amino acid sequence similarity to the adenine-guanine transporter in *Aspergillus nidulans AzgA.* During the past year we have completed our initial characterization of these genes and discerned the function of their proteins. We have also identified At5g03555, a locus encoding a distinct protein related to the prokaryotic and eukaryotic proteins in the nucleobase cation symporter 1 family and to the purine related transporter family (PRT) in *Saccharomyces cerevisiae*. These proteins are responsible for the movement of uracil, uridine, allantoin, thiamine or cytosine. We characterized the function of this transporter *in planta* using a T-DNA "knock-out" line deficient in functional *At5g03555*. Growth studies on 8-azaguanine, 5-fluorouracil and 5-fluorocytosine reveal enhanced resistance to 5-fluorouracil and 8-azaguanine and 5-flurocytosine but not pyrithiamine a thiamine analogue) 5-bromodeoxyuridine or 2-fluorodeoxyuridine. Lack of this specific transporter has no discernible effect upon growth of allantoin as the sole nitrogen source. Heterologous expression studies in yeast confirm this solute transport specificity. Expression of the *At5g03555* coding region in a cytosine/adenine transport deficient yeast line (*fcy2*) confers sensitivity to 5FC, 8AA and 8AG. Our results confirm the solute specificity of a novel Arabidopsis cytosine/guanine/adenine transporter.



Impact

The movement of nitrogen and carbon-based compounds within plants is highly regulated by transporter proteins in the cell membrane. Understanding nitrogen and carbon use patterns by plants will have important implications for both basic plant biology as well as applied science. Developing plants that use fertilizer more efficiently is just one example of how results from this research may be applied. Our investigations on nucloebase-ascorbate transporter genes in plants has an impact on a number of other research laboratories investigating similar research interests. One example is the direct collaboration between our laboratory and the laboratory of Dr. Mourad concerning research of uracil transporter-encoding genes in *Arabidopsis thaliana*.

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 $273 million in 2007. In conjunction with regulatory activities, Department staff membersconduct a surveillance program in Connecticut for a variety of established pests and for exotic plant pests not yet established in the state, 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. Examples are Ramorum blight (aka Sudden Oak Death), a fungus-like pathogen that can affect many plants, but that can be particularly devastating to oaks and two beetles, the Asian longhorned beetle and Emerald ash borer that represent a threat to our maples (and other trees) and ashes, respectively. For plant diseases of regulatory concern, we work closely with the Plant Disease Diagnostic Laboratory in the Department of Plant Pathology and Ecology. We also conduct forest health surveys and a statewide aerial survey for gypsy moth defoliation and a gypsy moth egg mass survey. The results of our plant and 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, Celebrating Agriculture in Woodstock, CT, the Garden Expo in Fairfield, CT, the Yale Peabody Museum's Biodiversity Day, and the Connecticut Flower and Garden Show. Honey bees, butterflies, wood-boring beetles and/or ticks continue to be popular exhibits at these events.

SERVICE ACTIVITIES

Insect Inquiry Office: **Dr. Gale Ridge**, **Rose Hiskes**, and **Rose Bonito**, with the assistance in 2009 of **Katherine Dugas** and **Clifford Snow,** answered questions from the public. Rose Bonito retired from the Station July 1, 2009 and her assistance in the inquiry office and her outreach in the Bird and Butterfly Garden will be missed. The insect inquiry office in its present

form has provided services for over 40 years. Insect identification services date back to the earliest days of the institution starting with the first Annual Report of the Connecticut Agricultural Experiment Station published in 1877. The station announced that was offering to "identify useful or injurious insect…..and to give useful information on the various subjects of Agricultural Science for the use and advantage of the citizens of Connecticut".

Between July 31, 2008 and June 30, 2009 the insect inquiry office handled at least 5,610 inquiries. These inquiries were quite diverse in subject with identification of over 974 different insect, arachnid, animal species, diseases, and questions on pesticides, insect damage, general entomological or horticultural problems, and similar issues. Most of the inquiries were from visitors (49% of total) to the office followed by telephone calls (40%), mail (9%), and e-mail (2%). Questions were related to food (8%), pests of humans or a person's dwellings (25%), or natural resources (67%). Human bed bug inquiries have continued to be one of the most important insects of concern, representing approximately 9% (501) of all inquiries. Household insect pests such as carpenter ants, termites, bees and wasps (mainly carpenter bees, honey bees, cicada killers, and yellowjackets), Indian meal moths, and carpet beetles were leading pests of concern. Delusionary parasitosis and ticks continued to be leading problems. The most common plant associated pests were various mites, grubs, aphids, scale insects, and the Hemlock woolly adelgid. There were 61 inquiries about the Asian longhorned beetle. The office served private citizens, pest control operators, the real estate industry, nurseries, land care businesses, arborists, health departments, other medical professionals, museums, municipalities, libraries, state government, and the news media.

Tick Testing: Ticks, primarily the blacklegged tick *Ixodes scapularis*, had the highest number of specimens submitted for identification. Ticks are processed in the Tick Testing Laboratory at the Experiment Station by **Elizabeth Alves** and **Bonnie Hamid**. A total of 3,404 ticks feeding on humans were submitted for identification in 2008, of which 3,126 were the blacklegged tick or "deer" tick, *Ixodes scapularis*. Beginning in 2006, the policy was changed to only test engorged ticks. Therefore, of the ticks received in 2008, 1,534 were tested for the presence of *Borrelia burgdorferi*, the causal organism for Lyme disease, and 345 (22%) were found to carry this organism.

Bird and Butterfly Garden: The Bird and Butterfly Garden is a partnership 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** and his staff. **Rose Bonito**, **Jeff Fengler**, **Rose Hiskes**, and **Vickie Bomba-Lewandowski** are involved with the garden as is the Spring Glen Garden Club which provides monthly care by its members. The garden is open to the public Monday-Friday 8:30am-4:00pm; it is closed on the weekends and state holidays. The garden creates several favorable habitats for our native birds, butterflies, and pollinating insects and helps us determine which plants may work best in Southern Connecticut gardens. Plants are labeled for easy identification. The Bird & Butterfly Garden at Lockwood Farm is listed in the 'Nature Conservancy Open Days Directory for New England'.

Rose Bonito, **Jeffrey Fengler**, and **Michael Thomas** observed 12 different butterflies species, 1 species of moth, 18 species of birds, 2 species of dragonflies, and 1 Eastern Cottontail rabbit and 1 Green Frog around the garden on Plant Science Day August 6, 2008.


Visitors view the butterfly display and Jeff Fengler leads a walk of the Bird and Butterfly Garden on Plant Science Day, 2008 (Photo by Rose Bonito).

Butterflies, moths, birds and dragonflies observed on Plant Science Day, August 6, 2008.

Butterflies	***Birds***	*Dragonflies*
Cabbage White	Bluejay	12-spotted Skimmer
Common Sootywing[a]	Northern Cardinal	Blue Dasher
Eastern Tiger Swallowtail[b]	Tree Swallow	
Spicebush Swallowtail	Barn Swallow	
Orange Sulphur	House Finch	
Monarch	Northern Mockingbird	
Tawny-edged Skipper	Song Sparrow	
Northern Broken Dash	Mourning Dove	
Pearl Crescent	European Starling	
Peck's Skipper	American Goldfinch	
Question Mark[c]	Red-winged Blackbird	
Clouded Sulphur	Red-bellied Woodpecker	
	Ruby-throated Hummingbird	
Moths		
Celery Looper	Indigo Bunting	
	Gray Catbird	
	American Crow	
	Turkey Vulture	
	Bald Eagle (adult)	

[a] including a larva; [b] including a black form; [c] including laying 3 eggs.

Sponsored Meetings and Conferences:

Getting Started in Organic Farming Conference (January 17, 2008, Jones Auditorium, New Haven). This event for beginning farmers or farmers who want to transition to organic practices was attended by 45 people. In addition to co-organizing the conference with Bill Duesing, Executive Director of the Northeast Organic Farming Association of Connecticut, **Dr. Kimberly Stoner** presented a talk on "Organic Methods of Pest Management." The keynote speakers were John and Lynn Holbrook of Holbrook Farm in Bethel,with the talk "Surprise! You Can Make a Living Doing This!" Other speakers were James Roby of Roby's Organic Farm in Berlin, on setting up a business and marketing strategies; Paul Bucciaglia of Fort Hill Farm in New Milford, on soil fertility and crop rotation; Dawn Pettinelli of the University of Connecticut, on making and using compost; and Don Franczyk of Baystate Organic Certifiers, on organic certification.

RESEARCH ACTIVITIES

Natural Products for Tick Control: **Dr. Kirby Stafford** and postdoctoral scientist **Dr. Anuja Bharadwaj** began studies on evaluation of natural products for tick control with a grant from the Centers for Disease Control and Prevention in 2008 and experiments continued through 2008 and 2009 with the assistance of **Heidi Stuber** and summer workers **Lindsley Colligan** and **Katherine Dugas**. Nootkatone, a component of the essential oil from the heartwood of Alaska yellow cedar, is also available as a synthetic and an extract from grapefruit. In 2008, a field trial with an emulsifiable concentrate (EC) formulation of Nootkatone containing 89.6% synthetic nootkatone, d-limonene and EZ-mulse in the ratio of 2:1:1 was tried in the field at two rates of application. The two rates of application were 1.6 and 0.3 g nootkatone/m^2. The lower rate of application was combined with Tick-Ex (an oil based EC formulation of entomopathogenic fungi, *Metarhizium anisopliae* strain F52) to see if the fungus could compliment the nootkatone for tick control. The nootkatone provided high levels of control (100 and 76%) with high and low rates, respectively, within a few days after the application. Control rapidly decreased to zero within 22 days. Filter paper disks caged in chicken wire mesh placed at the treatment sites were picked up periodically for the nootkatone residual analysis by the Department of Analytical Chemistry to see how long it lasted in the environment. Evaluation of nootkatone residues showed that nootkatone degraded rapidly in the environment with 95% or more of the nootkatone lost within 7 days. Preliminary trials for repellency against *Ixodes scapularis* nymphs were conducted in the field in July 2008 with treated and untreated flannel tick drags treated with carvacrol, another compound present in the Alaska yellow cedar essential oil. Two concentrations of carvacrol, 2 and 5% (v/v) in acetone were tested at 5 residential sites. The carvacrol showed some repellency against *I. scapularis*. The 2 and 5% concentration resulted in 25% and 87.5% fewer ticks, respectively on the treated fabric. The repellency tests will be repeated in 2009.

The first set of filter paper samples are collected by Dr. Bharadwaj with the assistance of Katherine Dugas and Heidi Stuber for rate and residual analysis.

In order to improve the efficacy of nootkatone in the field, Dr. Robert Behle at the USDA-Agricultural Research Service laboratory in Peoria, Illinois, a collaborator in the current project, developed several extended duration formulations of nootkatone. The formulations were 25% Nootkatone Soyscreen, 21% Nootkatone Maillard Soyscreen, Lignin Encapsulated 8% Nootkatone and Lignin Encapsulated 21% Nootkatone. A test in the laboratory was conducted to observe the effect of high temperatures and UV light. This test was done to find out the effect of UV exposure on the degradation of nootkatone for the new formulations as it was observed in the field trial in 2008 that 99.0% of nootkatone was lost after 18 days of application. UV light exposure lowered the concentration of nootkatone for each formulation. Overall the lignin formulations provided the best protection, followed by the Soyscreen, as expressed by the percentage of nootkatone remaining after exposure. Efficacy of two rates of application (1.0 and 2.0 g/m^2) of the formulations along with the classic EC formulation against *I. scapularis* nymphs was evaluated in laboratory. The same samples after being exposed to UV light were again tested for efficacy against *I. scapularis* nymphs. Based on the results of efficacy testing against nymphs of all the five formulated samples before and after exposure to UV light, the 21% Nootkatone Maillard Soyscreen and the Lignin Encapsulated 21% Nootkatone samples appeared to be the most promising for testing in the field.

A field trial with Lignin Encapsulated 21% Nootkatone was conducted at 3 home sites in Salisbury, Cannan, and Cornwall on 17 June 2009. Like 2008, initial sampling of the nootkatone treated sites showed 100% control. A garlic-based product (Mosquito Barrier, Garlic Research Labs Inc., Glendale, CA) was also tested in plots at 8 home sites for effectiveness as a repellent against *I. scapularis*. We observed 70% repellency against *I. scapualris* adults with the same product in a small trial in the laboratory. The tick sampling is under progress and all the data will be compiled at the end of tick season.

Impact: Results of the field and laboratory experiments show that nootkatone is effective in controlling *I. scapularis* and has potential to be developed as a natural tick control product. Work needs to continue to develop or improve the new extended duration formulations. The natural products could provide environmentally safer alternatives to synthetic pesticides for tick control.

Pesticides in Pollen – Baseline Survey: There is great concern across the U.S. and around the world about mortality of honey bees and the more general decline of many other species of pollinators. Pesticide exposure is one of many factors that may play a role in honey bee and pollinator decline. In order to measure pesticide exposure of pollinators in Connecticut, **Dr. Kimberly Stoner,** with assistance from **Nate Brettschneider, Tracy Zarrillo** and **Morgan Lowry**, and in collaboration with **Ira Kettle**, state apiary inspector, has been collecting pollen twice weekly from honey bee hives in multiple locations across Connecticut beginning in 2007 and continuing to the present. **Dr. Brian Eitzer**, of the Department of Analytical Chemistry, then tests the pollen for a wide range of pesticides using liquid chromatography/mass spectrometry.

In the samples from 2007 and 2008, we have been able to detect at least one pesticide residue in each pollen sample from both years. In 2007, we found 37 pesticides, with a mean of 4.7 pesticides in each sample. In 2008, we found 29 pesticides, with a mean of 5.4 pesticides in each sample. In both years, coumaphos was the most frequently detected pesticide. Coumaphos is used inside hives to manage *Varroa* mites, which are severe pests of honey bees. No coumaphos was used in any hive during our sampling period, but coumaphos apparently is held in the wax for several years and continues to appear in the pollen samples at least 3 years after the last treatment. Other frequently detected pesticides in 2007 were carbaryl (insecticide, highly toxic to honey bees), phosmet (insecticide, highly toxic to honey bees), atrazine (herbicide), imidacloprid (insecticide, highly toxic to honey bees), and carbendazim (fungicide). The most frequently detected pesticides in 2008 were coumaphos, atrazine, penidmethalin (herbicide), imidacloprid, dithiopyr (herbicide), and carbendazim. Herbicides and fungicides are generally less acutely toxic to honey bees than insecticides, although some fungicides are toxic to honey bee larvae, and some act synergistically to increase the toxicity of insecticides.

Types of pollen pellets sorted by color and texture from a single pollen sample trapped from one honey bee hive.

Impact: The role of chronic low-level exposure to pesticides not well documented. This study will provide critical baseline data on low-level exposure to pesticides in order to evaluate the role of pesticides on honey bee health.

Improved Use of Lindgren Funnels: **Dr. Chris Maier**, assisted by **Ellen Bulger**, **Morgan Lowry**, **Rebecca Tellar**, and **Tracy Zarrillo**, investigated how modifications to baited Lindgren funnels, traps that imitate the form and sometimes the odor of a tree trunk, can improve the detection of wood-boring beetles, wasps, and their natural enemies. In their first experiment of 2008, they examined how the catch of beetles differed among Lindgren traps supplied with killing agents of vapona (2,2-dichlorovinyl dimethyl phosphate), soapy water, antifreeze (propylene glycol), or 70% ethyl alcohol in the collection cup. Vapona was incorporated into an insecticidal strip placed in a dry collection cup; the other three agents were fluids. In a broad-leaved forest, the number of longhorned, predatory checkered, and bark beetles were greatest in traps with 70% ethyl alcohol. This result was expected because ethyl alcohol is a well-known beetle attractant. The use of additional ethyl alcohol to increase the effectiveness of traps probably will be limited because alcohol is too expensive for most survey projects.

In the spring and the summer of 2008, they conducted an experiment in another broad-leaved forest to learn how the catch of various beetles is affected by changing the size of the flat lid on top of Lindgren traps. The number of longhorned and checkered beetles in traps decreased when the circular lid was increased from the original size of 12 inches to one of 24 inches. A moderate increase to 18 inches, however, had no effect on the number of these beetles captured. Especially in autumn, leaves and pine needles can collect in the funnels to prevent insects,

especially wood wasps, from entering the collection cup at the bottom of traps. The accumulation of water in cups can dilute killing agents or preservatives to lower quality of trapped specimens. In the autumn of 2008, Dr. Maier and his assistants found that the amount of debris and water was significantly lower in traps modified to have lid sizes of 18 and 24 inches than in those with lids of 12 inches. Additional experiments are underway to determine if the trend is similar at other times of the year.

Impact: This research will optimize use of the Lindgren funnels to decrease the amount of debris and water in collection cups, increase the catch of targeted insects, and improve pest detection surveys.

Surveys for Invasive Bees and Other Insects: In 2008, **Dr. Maier**, assisted by **Morgan Lowry** and **Tracy Zarrillo**, completed a survey to determine the distribution of three exotic leaf-cutting bees (Megachilidae) in Connecticut and nearby states. They discovered that the three bees (*Anthidium manicatum*, *Anthidium oblongatum*, and *Megachile sculpturalis*) had spread throughout Connecticut and had reached many counties in nearby states. Their discovery of *Anthidium manicatum* in Massachusetts and Rhode Island and of *Anthidium oblongatum* in Connecticut, Massachusetts, New Hampshire, Rhode Island, and Vermont, represented the first state records. These bees mainly use non-native floral hosts, many of which are abundant in flower gardens or along roadsides. Foreign bees are likely to have a negative impact upon native bees, but this has yet to be demonstrated experimentally.

In 2009, **Dr. Maier** and his assistants found the first wild population of the European viburnum leaf beetle (*Pyrrhalta viburni*) on viburnum plants growing in a swamp in Goshen. State inspectors previously found this foreign beetle in two nurseries in central Connecticut where it apparently was accidentally introduced on imported plants. Both the larvae and the adults feed upon the foliage of wild and landscape shrubs, potentially disfiguring susceptible viburnum species. Dr. Maier and his team also have discovered many new sites in Connecticut and nearby states where the following alien insects are established: the oak-bush cricket (*Meconema thalassinum*), the lily leaf beetle (*Lilioceris lilii*), an herbivorous ladybird beetle (*Subcoccinella vigintiquatuorpunctata*), and the honeysuckle borer (*Agrilus cyanescens*).

Longhorned Beetles in Connecticut: The boring of larval longhorned beetles can kill trees, damage timber and firewood, and destroy agricultural crops. Over the past several years, **Dr. Maier** and his assistants have trapped and reared longhorned beetles to determine their distribution, preferred hosts, and period of adult activity. They have estimated that about 225 species of longhorned beetles could potentially infest plants in Connecticut. By combining data from field studies and museum collections, they have found 190 species (84% of the potential total) in the state. In 2009, they discovered two species (*Centrodera decolorata* and *Microclytus compressicollis*) not previously reported from Connecticut. Thus far, they have reared 70 species from dead wood collected in New England, and examined the adult activity of these and additional species. They are building a database, which now has over 6,800 entries with biological data derived from their studies.

Impact: The information from these surveys and the longhorned beetle database will document native and exotic invasive insects and wood-borers in Connecticut and assist in developing management plans for the wood-borers that are pests.

Small Japanese Cedar Beetle: Dr. Claire Rutledge continued investigation of *C. 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 Dr. Gale Ridge, Carol Lemmon and Dr. Chris Maier. The borer has since established in the southern half of Connecticut. *C. rufipenne* is found on plants in the family Cupressaceae. Males recognize females by means of a contact pheromone in the female's epicuticle. We have identified the contact pheromone as the branched, saturated hydrocarbon 5,17 – dimethylnonacosane and completed synthesis of the compound. In spring 2009, Dr. Rutledge investigated the possibility of a trail pheromone being produced by the females, but found no evidence suggesting that the beetles use this type of communication.

Agrilus species – The genus *Agrilus* (Coleoptera: Buprestidae) contains several species of economic importance, both native and invasive. Dr. Rutledge is pursuing several lines of research with three members of this genus. The Bronze Birch Borer (BBB), *Agrilus anxious* Glory, a native insect, requires 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 owners and managers of nurseries in Connecticut. The Two-lined Chestnut Borer (TLCB), *A. bilineatus* (Weber) is a pest of oaks. While not often a landscape pest, it can be problematic when oak trees are stressed by other problems such as drought, winter moth or gypsy moth. The invasive pest the Emerald Ash Borer (EAB), *A. planipennis* Fairmaire is a native of Asia that was discovered in Detroit, MI in 2002 and has spread widely. While not yet in Connecticut, research is crucial to preparing for its expected arrival.

One project is comparing the mating behavior and physiology of BBB, EAB and TLCB is being done in collaboration with Dr. Juli Gould of USDA APHIS and Dr. Melody Keena USDA FS. The mating behavior of EAB is very similar to both BBB and TLCB except that EAB mates for 1 hour and BBB and TLCB mate for 5 minutes. While the significance of this observation is still unknown, it suggests differences in the ecology of the beetles which may be exploitable for control measures.

An ongoing project is examining the native natural enemies of both BBB and TLCB that may transfer to EAB when it invades Connecticut. This year, Drs. Rutledge, Theodore Andreadis and Charles Vossbrink found a microsporidian, a pathogen in locally collected BBB. The first microsporidian known to infect Buprestidae was discovered in BBB by a Canadian group in 2008 and this is the first identification in the United States. We are still working on molecular confirmation of its identity, but morphologically it conforms to the description of the microsporidian found in Canada. We also discovered a nematode infesting the gonads of both male and female BBB. This nematode is also awaiting identification.

In collaboration with the CAPS program of USDA APHIS surveys are ongoing for EAB. Twenty traps specifically designed to attract EAB, purple panel traps baited with a mix of manuka and phoebe oils, have been deployed throughout the state focusing on vulnerable areas such as importers and campgrounds. To date no beetles have been found.

Finally, we are working for the second summer on a project funded by USFS on the buprestid hunter *Cerceris fumipennis* (Hymenoptera: Crabronidae). This native, solitary hunting wasp uses adult buprestid beetles to provision her nest for her larvae. The wasps nest in colonies of 1 – 500 holes and prefer hard-packed sandy soil. When colonies are located, it is easy to

monitor the wasps returning to their holes and identify the beetles that they are carrying. In areas that are infested by EAB, the wasps will bring EAB adults to the nests. Thus, the wasp provides a highly efficient, effective and free 'bio-surveillance' system. We are locating colonies in Connecticut, and monitoring them for the presence of EAB. We are also collecting and identifying the native buprestids brought by the wasps, as this is an excellent way to monitor a fauna that is by nature difficult to find.

Impact: Some native and exotic wood-boring beetles can pose a significant threat to nursery, landscape, and forest trees. Pest detection and knowledge of the biology and possible natural enemies of these beetles are important to successful eradication of imported pests or development of management plans for established wood-borers that are pests.

NURSERY AND PLANT INSPECTION ACTIVITIES

Plant inspection and regulatory services are coordinated and conducted by State Entomologist **Dr. Kirby Stafford**, Deputy State Entomologist **Dr. Victoria Smith**, Plant Inspectors **Peter Trenchard**, **Stephen Sandrey**, **Jeffrey Fengler**, **Tia Blevins**, and Apiary Inspector **Ira Kettle**.

The Survey and Inspection Team at the Eastern Plant Board Meeting (April 6-9, 2009, Portland, ME). The 84th Annual Meeting of the Eastern Plant Board was held in conjunction with the 35th Annual Meeting of the Horticultural Inspection Society (HIS) and the Cooperative Agricultural Pest Survey (CAPS). During the EPB Meeting, **Dr. Victoria Smith** presented annual reports on behalf of the National CAPS Committee and the National Plant Board *P. ramorum* Working Group, and was elected Vice President of the Eastern Plant Board. For the HIS meeting, **Peter Trenchard** presented two talks titled "CWR Strikes Again" and "Trace-back Troubles: another *P. ramorum* Saga." Peter was also elected Newsletter Editor for HIS, **Steve Sandrey** was elected Archivist, and **Tia Blevins** was elected Treasurer. **Rose Hiskes** attended the CAPS meeting as the State Survey Coordinator for Connecticut, and participated in discussions on data management, GIS mapping, surveys, and taxonomy.

Nursery Inspection and Certification: Three-hundred and five nurseries were certified to conduct intra- and interstate business. There were 636 nursery inspections during the growing season. Eight-thousand, four-hundred and sixty-one acres of nursery stock were examined as well as plants growing under 32,737,495-sq. ft. of greenhouse space. The majority of plants were grown in hoop houses (28,408,332 sq. ft.), followed by plastic greenhouses (2,627,263 sq. ft.) and glass greenhouses (1,701,900 sq. ft.).

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

Japanese Beetle Certification: We observed treatments of 113,418 plants at one nursery 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 65 plants to other states in 2008. Five nurseries met other

requirements of the United States Japanese Beetle Harmonization Plan and shipped 4,070 plants to states that quarantine plants from Connecticut.

Japanese Beetle Certification to Canada: Fifteen Connecticut nurseries, which met the inspection requirements of the US/Canada Japanese Beetle Harmonization Plan, shipped 149,963 plants to Canada in 2008.

Nursery Dealer Permits: Nursery dealer permits were issued to 176 firms. One-hundred and fifty-four of these companies operate individual outlets. The remaining businesses have more than one outlet each. In total, there were 556 outlets.

Phytosanitary Certificates: Four-hundred and fifty-one phytosanitary inspection certificates were issued covering the shipment of the following plant materials to destinations outside the United States:

Plants	Number
Apples (Cartons)	10,000
Bulbs & Tubers (Dahlia & Gladiolas)(Bags)	680
American Chestnut (scions)	33
(seeds)	151
Chinese tree peonies (plants)	2
Greenhouse plants	101,272
Nursery stock (containers - B & B)	27,175
(bare root plants)	16
(unrooted cuttings)	48
Lumber (pieces)	1,281
Orchids (plants & flasks)	4,322
Perennials (bare root plants)	4,072
(plants)	21,279
Seeds (cartons & bags)	216
Tobacco (bales, boxes, bundles & cartons)	206,529
Tobacco (Reconstituted) (Cartons)	48

Special Inspections: Eleven inspections were made for 89 individual plants and bulbs to assist homeowners moving out of state. One tobacco grower had 120 acres inspected for the aerial application of pesticides. Nine post-entry inspections were carried out on 5,052 plants at 3 locations. At three sites, 5,052 plants were released from quarantine. One-hundred and ninety-eight inspections were made to assist nurseries moving the following plants interstate:

Plants	Number
Perennials (plants)	113,404
Nursery stock (containers)	96
Nursery stock (bare root plants)	1,500
Nursery stock (B & B)	935
Corn seed (pounds)	210
Geraniums	1,917
Greenhouse plants	639
Hemlock logs (Board feet)	100,000
Seed (Bags)	69

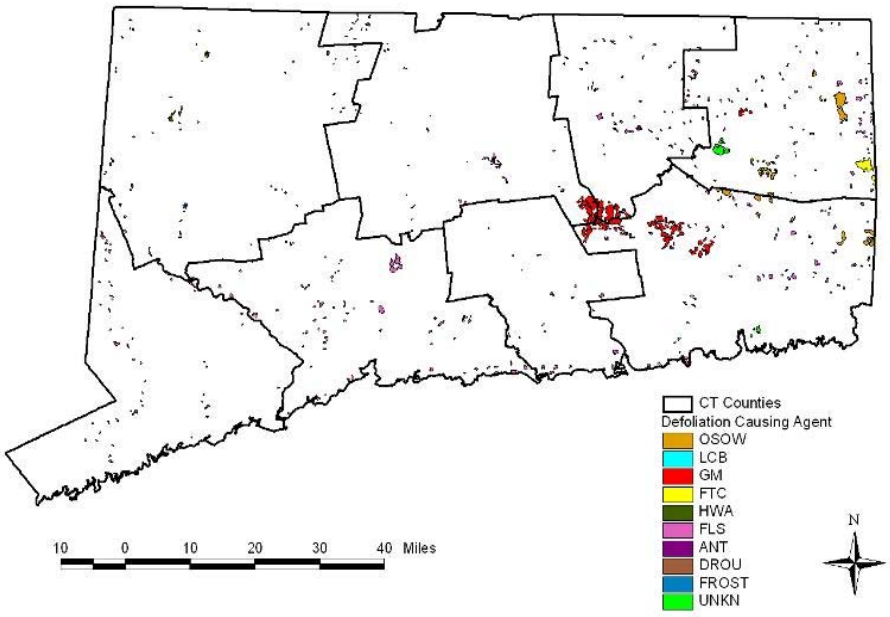
Biotechnology Regulatory Services Inspection Activity: In cooperation with officers from the Wallingford USDA-APHIS-PPQ office, three inspections were conducted in 2008 at facilities or laboratories working with recombinant or regulated organisms.

INSECT AND DISEASE SURVEYS

In cooperation with federal agencies such as USDA-APHIS-Plant Protection and Quarantine and USDA-Forest Service, we conduct surveys for a number of exotic pests that may threaten the health and productivity of Connecticut agriculture and forests. These efforts are directed for early detection of introduced pests and diseases, which would facilitate rapid eradication and clean-up. Asian longhorned beetle, Emerald ash borer (mentioned earlier), Chrysanthemum white rust, daylily rust, and Ramorum leaf blight are just some of the insects or diseases that we survey for.

Forest Health Monitoring: During the summer of 2008, 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.

DEFOLIATION IN CONNECTICUT - 2008



Gypsy Moth: Our annual aerial survey for gypsy moth defoliation was conducted by **Dr. Victoria Smith**, **Peter Trenchard**, and **Tia Blevins** in July-August 2008 and covered 1.8 million acres of urban/suburban forest in all eight Connecticut counties. Gypsy moth defoliation of 13,625.4 acres was found in five counties (see Table). This was substantially more than observed the previous year when 3,203.57acres in four counties were defoliated.

County	Total Acres
Hartford	2786.3
Middlesex	50.7
New London	7469.5
Tolland	2901.5
Windham	417.4
Total	13,625.4

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 three sites egg masses were found in sufficient numbers to cause defoliation in 2009.

*Orange-striped Oakwor*m: The Orange-striped oak worm, *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 October 2, 3, &10, 2007, a statewide aerial survey was conducted for orange-striped oak worm defoliation. Defoliation was found in Windham County (3,259.5acres) and in New London County (2,433.4 acres). Total acres defoliated were 5,692.9.

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 2008, an outbreak of Forest tent caterpillar resulted in the defoliation of 2,373.5 acres in Windham County. A total of 2,373.5 acres were defoliated.

Asian Longhorned Beetle: The Asian longhorned beetle, *Anoplophora glabripennis*, first discovered to be attacking trees in August of 1996 in New York, 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 areas of the world where

this beetle is found. 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. We also participated in a United States Forest Service survey in Southwestern Connecticut. We examined 300 Asian longhorned beetle host species trees in 18 square miles in Greenwich and Stamford. All surveys and identifications, thus far, were negative. We also inspected five trees for 2 homeowners in 2008.

Asian Longhorned Beetle Survey 2008

County	# Inspections	# Trees Inspected	# Infested Trees
Fairfield	8	810	0
Middlesex	1	28	0
New Haven	8	690	0
New London	20	2,357	0
Totals	37	3,885	0

Septoria Leaf Spot Maple: Rainy and cool weather throughout Connecticut during spring and summer created conditions ideal for the fungus known as *Septoria aceris*, which causes septoria leaf spot. A septoria infection is characterized by small brown spots rimmed with yellow when the leaves are still green. As the spots grow and merge, they perforate the leaves, resulting in premature leaf drop and defoliation. The long-term implications for the trees' health are minimal. Damage due to Septoria Leaf Spot of maple was considerable enough to warrant mapping during aerial survey. Data are included on the defoliation map and are summarized below by county.

County	Total Acres
Fairfield	1,820.2
Hartford	363.9
Litchfield	107.9
Middlesex	1,004.8
New Haven	4,028.3
New London	3,333.0
Tolland	1,712.2
Windham	3,055.3
TOTAL	15,425.6

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 2008, 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 940 plants in these shipments. We also certified 100,000 board feet of hemlock logs that were shipped to states with a quarantine.

Light Brown Apple Moth: In cooperation with the USDA-APHIS-PPQ office in Wallingford CT, twenty-five locations were selected for trapping for light brown apple moth (LBAM) in 2008. Trapping at ten nursery locations was conducted by USDA officers, and trapping at 15 orchard locations was conducted by CAES personnel. Traps were deployed for two-week intervals from July through September. Gypsy moth adults were caught in the traps in considerable numbers, but no light brown apple moths were captured.

Ramorum Leaf Blight: As part of the *P. ramorum* National Nursery Survey, we inspected 20 nurseries during 2008. During the survey, 148,379 plants were inspected and 207 samples were collected from symptomatic plants. All samples were cultured and tested by an enzyme-linked immunosorbent assay; DNA from ELISA-positive plants was sent to Beltsville for confirmation by PCR. One hundred one samples were ELISA positive; none were PCR-positive. One garden center that had a positive plant in 2006 was included in the survey as part of the Confirmed Nursery Protocol (CNP). Twenty-one samples were collected for the CNP; fifteen were ELISA-positive and none were PCR-positive. The garden center was released from CNP.

In conjunction with the US Forest Service, two streams were selected for baiting for *P. ramorum*. One was near a location were positive plants were found in 2004, which were buried in 2005, and the second location was not near any potential sources of *P. ramorum*. Streams were baited with rhododendron leaves for 2-week deployments April through September 2008, with a 6-week break during July and August, when water temperatures were too warm for *Phytophthora* species. Leaf baits were submitted for testing to laboratories at Mississippi State University and Cornell University. All baits were negative for *P. ramorum*.

Rhododendron showing symptoms of infection with *P. ramorum* (photo V. Smith).

In late June of 2008, we received orders for a trace back to be conducted at a CT nursery. *P. ramorum*-positive plants had been found at a garden center in North Carolina; this establishment also had received plant material from many other suppliers. Sixty-three samples were taken representing symptomatic foliage, and irrigation water in 3 ponds was baited with rhododendron leaves. All samples were cultured and tested by ELISA; DNA from ELISA-positive samples was sent to Beltsville for confirmation by polymerase chain reaction (PCR). Forty-eight foliar samples were ELISA-positive, and none were PCR-positive. The six aquatic samples were negative.

In late December of 2008, a second trace back was ordered in connection with plants sent from the North Carolina garden center to a garden center in South Carolina. Again, this establishment also had received plant material from many other suppliers. Samples were treated as outlined above. Fourteen samples of symptomatic foliage were collected, 5 were ELISA-

positive, and none were PCR-positive. No aquatic samples were taken in the second trace back, as the irrigation ponds were frozen solid.

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 2008, we surveyed daylilies in nurseries and garden centers for signs of this rust. Eighty-four inspections were carried out on 86,473 plants. No signs of *Puccinia hemerocallidis* were found.

Chrysanthemum White Rust: On August 15, 2008, a homeowner in Norwalk, CT called the Plant Disease and Information Office to report that she had observed symptoms of chrysanthemum white rust (CWR) on eight chrysanthemums planted in front of her condo. The chrysanthemums had been purchased in 2007 and had overwintered in situ. The cultivar and source of the plants were unknown at the time of the report. In cooperation with USDA-APHIS-PPQ, CAES personnel visited the location and collected samples of symptomatic foliage. CWR was confirmed, and all eight plants were uprooted and disposed of in the municipal waste stream, which ultimately ends with incineration.

Chrysanthemums showing symptoms of infection with *P. horiana* (photo V. Smith).

During 2008, we continued to survey for chrysanthemum white rust, *Puccinia horiana*. We inspected 562,373 chrysanthemums raised by 34 growers and dealers for presence of chrysanthemum white rust.

On August 25, 2008, CAES received a report from a plant broker that one of his customers suspected CWR on chrysanthemums obtained earlier in the summer. In cooperation with USDA-APHIS-PPQ personnel, we visited the location in Litchfield County, collected samples of symptomatic foliage, and confirmed presence of chrysanthemum white rust. This grower had already sold plants to two retail locations, and had given chrysanthemums to a friend for her growing operation, so trace forward activities were initiated. Chrysanthemums at the friend's location were chrysanthemum white rust-positive and were destroyed by burial. On visiting the two retail locations, we found chrysanthemum white rust-positive plants from two additional growers, one in Massachusetts and one in CT. All chrysanthemums at the Litchfield location were eventually destroyed by burial on site. All chrysanthemums at the two retail locations were destroyed by burial as well.

At the grower in Connecticut, approximately 50 acres of chrysanthemums were inspected and chrysanthemum white rust was confirmed on several varieties. The grower attempted to limit his losses by culling and spraying, but was unsuccessful. Eventually, over 61 tons of regulated plant material (8,500 plants) and potting mix valued at $200,000 were destroyed by incineration. In addition, a supermarket chain that had received chrysanthemums from the grower in MA was

inspected and found to have chrysanthemum white rust -positive mums. These plants were bagged, disposed of in the municipal waste stream, and eventually incinerated. Sharing coordination of the activity were Kate Aitkenhead (USDA-APHIS-PPQ) and Vicki Smith (Entomology), and assisting were Nicole Campbell (USDA-APHIS-PPQ), Tia Blevins, Jeff Fengler, Steve Sandrey, and Peter Trenchard (Entomology).

On September 17 and 18, 2008, a Strike Team (ST), consisting of two scientists from the Center for Plant Health Science and Technology (CPHST), visited Connecticut and Massachusetts, to observe the locations of the outbreaks of chrysanthemum white rust, discuss the situation with PPQ, CAES personnel, and the chrysanthemum producers involved. Eastern Region PPQ believed that these data would be instructive and would help to prevent or reduce future chrysanthemum white rust outbreaks in the US. The Strike Team visited all locations of the chrysanthemum white rust occurrence in both Connecticut and Massachusetts, but was unable to conclusively determine the source of the infestations or offer any concrete remedies for future use.

Apiary Certification and Inspection: Five hundred and ten beekeepers registered 3,583 colonies in 2008. Our bee inspector, Ira Kettle, opened and inspected 1,446 colonies in areas known to have foulbrood disease. American foulbrood was found in 7 colonies. These colonies were destroyed. Eleven cases of chalkbrood were reported. Small hive beetles were reported in 4 counties and seem to be a seasonal problem. Three complaints of Africanized honey bees were determined to be aggressive European honey bees.

County	Colonies Opened & Inspected	Small Hive Beetle
Windham	311	
New London	215	
New Haven	499	+
Hartford	243	+
Middlesex	13	+
Litchfield	69	
Fairfield	87	+
Tolland	9	
Totals	1,446	

Varroa mites were present in all colonies, treated or untreated. The severity of the infestations is on the rise due to resistance to Fluvalinate and Coumaphos. Beekeepers are being advised to monitor mite levels more carefully. Queen failure is becoming a problem. One thousand honey bees from 4 apiaries in Somers, Deep River, East Haddam and Farmington were examined in the laboratory for tracheal mites, *Acarapis woodi*. There were no positives for tracheal mites.

DEPARTMENT OF FORESTRY AND HORTICULTURE

Investigation of new crops is essential to provide new opportunities for farmers during a time of changing agriculture in Connecticut. Tobacco and dairy farming in Connecticut have declined dramatically in the last four decades. However, the number of vegetable farms increased from 579 in 1992 to 582 in 2002. Today, about 11,000 acres in Connecticut are devoted to vegetable production. In 2004, the cash value of all vegetable crops grown on approximately 10,000 acres in Connecticut was 24.8 million dollars, this compares to 16.2 million dollars in 1999.

The marketing of produce in Connecticut has shifted from wholesale contracts with local supermarkets to direct retail sales. Approximately 441 farms offer direct sales through roadside stands and sales rooms, where a variety of fruit, vegetables, nursery stock, and Christmas trees are offered. About 36 of these are open all year. Nearly 30% of these farms offer pick-your-own fruit and vegetables to reduce the cost of harvest labor. These savings are passed on to the consumer.

The development of a network of farmers' markets in Connecticut's major urban centers and densely populated suburbs is an important segment of direct sales of vegetables to consumers. All produce sold at farmers' markets must be "Connecticut Grown". Farm fresh produce is offered at reasonable prices to urbanites who cannot travel to the farms. Niche crops valued by diverse ethnic groups are generally sold through these markets. In 2008, there were 114 farmers' markets attended by over 400 farmers compared to 87 markets in 2007. Many farmers wish to diversify their operations by growing ethnic and specialty vegetables, but little information on the culture of these vegetables in Connecticut is available.

Direct retail sales and small farm sizes require that the farmer grow diversified high-value crops. Since 1982, The Connecticut Agricultural Experiment Station has been investigating specialty crops to provide new opportunities for Connecticut's farmers. Over 40 fruits and vegetables have been studied resulting in over 50 publications. Some of the crops studied in the New Crops Program include globe artichoke, Belgian endive, radicchio, heirloom tomatoes, sweet potatoes, specialty melons, okra, and tomatillos. Research included variety trials and experiments to determine the best cultural methods for growing each specific crop in Connecticut. Crops that were chosen have a high market value and an existing or expanding market that would readily accommodate these commodities.

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 114 farmers' markets. **Drs. Abigail A. Maynard and David E. Hill** 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 mature on short vines is appealing to northern growers because the majority of fruit can mature before frost. Fruit that

form on longer vines do not always reach maturity. Last year, 86% of the plants at Lockwood Farm produced fruit within 2 feet of the plant compared to 75% of the plants at Windsor. Selections will continue for several more years.

Impact: Seeds from our selections have been distributed to several commercial growers and backyard gardeners interested in growing calabaza. Yields in 2008 were 21,490 lbs/A. At a retail price of $0.99/lb, there is a potential crop value of $21,275/acre. The long-term benefits include additional revenue for farmers, especially those who attend farmers markets in urban areas.

Vegetable Amaranth Trials: Vegetable Amaranth (Callaloo) is an annual that is native to central Mexico. In Asia and the West Indies, amaranth is widely used in soup. Although it is relatively unknown as a vegetable crop in the United States, it has traditionally been cultivated throughout the humid tropics and is consumed extensively in Africa, Asia, the Caribbean, and Latin America. The greens are of considerable nutritional value being high in calcium, magnesium, iron, vitamins A and C as well as protein. In 2008, **Dr. Maynard** evaluated 8 vegetable amaranth cultivars at Windsor and Lockwood Farm.

Impact: All Red had the greatest yields (4.2 lbs/plant) with Red Striped Leaf averaging 3.5 lbs/plant. At a retail price of $0.99/lb, there is a potential crop value of $40,656/acre. High yields of a quality product will benefit local growers and consumers by providing revenue for farmers, a nutritious food for consumers, and preservation of farmland.

Sweet Potato Trials: A 1998 Connecticut Department of Agriculture survey showed that sweet potato is one of the most popular specialty vegetables. In the South, the sweet potato is also called yam, but both are identical species. In the United States, North Carolina and Louisiana are the leading producers, but we have found that they can easily be grown in Connecticut. This crop has both a high market value and an expanding market. In addition, it is very nutritious, with high values of beta carotene (vitamin A) and vitamin C. In 2008, **Dr. Maynard** evaluated several cultivars that have short maturities (90 days) at Windsor and Lockwood Farm.

Impact: Beauregard (5.2 lb/plant) and Carolina Ruby (3.8 lbs/plant) had the greatest yields. At a retail price of $0.79/lb, there is a potential crop value of $44,736/acre. The long-term benefits include additional revenue for farmers and providing a product that has growing consumer demand. In addition, there may be health benefits for those who consume sweet potatoes.

Chinese Cabbage Trials: Local supermarkets have reported increased sales of Chinese vegetables. These sales coincide with the influx of immigrants from the Far East. Vegetables are staples in oriental cuisine and stir-fry cooking has become increasingly popular in the kitchen. In 1988-1989, we tested 26 cultivars of Chinese cabbage at Lockwood Farm and Windsor. Most of these cultivars are no longer available and, since that time, new cultivars have been developed that are more disease resistant and produce higher quality heads. In 2008, **Dr. Maynard** evaluated 10 cultivars of Chinese cabbage in spring and fall at Windsor and Lockwood Farm.

Impact: In spring, the cultivars Optiko (17.0 T/A) and Nikko (14.6 T/A) had the greatest yields. In fall, Blues (17.6 T/A) and Tarranko (16.9 T/A) had the greatest yields. At a retail price of $0.99/lb, there is a potential crop value of $34,758/acre. The long-term benefits include additional revenue for farmers, especially those who attend farmers markets in urban areas.

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 2008, **Dr. Maynard** evaluated six cultivars of personal-sized seedless watermelon for yield and quality at Windsor and Mt. Carmel. Unlike other sized watermelons, personal-sized watermelons are sold by the melon, not by the pound. Therefore, estimated yields were measured in number of fruit per acre. At both sites, the cultivar Meilhart produced the greatest number of fruit between 3 and 7 pounds, producing as many as 24,400 fruit per acre. Wonder had the second greatest yields, producing over 16,000 fruit per acre. The standard cultivar Vanessa produced about 10,000 personal-sized fruit per acre.

Impact: By growing the cultivar Meilhart instead of Vanessa, the grower can produce 14,000 more personal-sized watermelons per acre. At $4.99 retail price/fruit, the grower would potentially gross almost $70,000 more per acre by growing Meilhart instead of the standard cultivar Vanessa. The long-term benefits include additional revenue for farmers and providing a product that has growing consumer demand. In addition, there may be health benefits for those who consume watermelon.

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. 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. One factor contributing to this strong surge in use is the rising popularity of ethnic foods and proliferation of ethnic restaurants. In addition, there have been numerous news releases describing the health benefits of garlic. In 2008, **Dr. Maynard** evaluated 10 garlic cultivars at Windsor and Lockwood Farm.

Impact: Music had the greatest yields (37,171 lbs/acre) and Transylvanian averaged 31,218 lbs/acre. At a retail price of $2.50/lb, there is a potential crop value of $92,928/acre in Connecticut. The long-term benefits include additional revenue for farmers, especially those who attend farmers markets in urban areas.

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. Thus, many growers are

interested in adding minor specialty fruits to their operations. In response to this grower interest, **Dr. Maynard** in 2001 expanded the New Crops Program at the ExperimentStation to include fruits. This trial, also repeated at the Valley Laboratory in Windsor, includes 12 cultivar/rootstock combinations of Japanese plum.

Impact: The greatest yields in 2008 were from Beauty (105 lb/tree) and Shiro (98 lb/tree). At a retail price of $1.99/lb, a planting of 242 Beauty trees per acre would yield a potential crop value of $50,566/acre. Long-term benefits include diversification and greater profits for fruit growers.

At the request of fruit growers, 306 beach plum seedlings were planted in 2003 at the Station's two experimental research farms. These seedlings were raised at Cornell University from seeds collected from 35 sites from Maine to Delaware.

Impact: In 2008, heavy yielding plants produced as much as 17 lb/plant. Total production was estimated to be 129 lbs from 134 plants in Hamden and 74 lbs from 87 plants in Windsor. At a retail price of $2.00/lb, there is an expected crop value of $52,270/acre. The immediate impact is that growers at two of Connecticut's largest farms are now growing beach plums, which can be made into a premium jam which sells for $6.40 for an 8 ounce jar. Long-term benefits include diversification and greater profits for fruit growers.

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 compared to hybrid tomatoes. They are also more susceptible to cracking due to their tender skin. In 2008, **Dr. Maynard** evaluated ten cultivars of early maturing ethnic heirloom tomatoes for yield and quality at Windsor and Mt. Carmel.

Impact: Yields of Reif Red Heart and Rose were greatest (26 lbs/plant, respectively). At a retail price of $1.99/lb, there is a potential crop value of over $167,000/A. The long-term benefits include an additional product and revenue for growers who attend farmers' markets or have their own roadside stands.

Sheet Composting of Oak and Maple Leaves: Many municipalities in Connecticut, which have 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. 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 1994-2007 and incorporated into the soil by rototilling. Last year, lettuce, peppers, onions, and carrots were grown with all plots receiving the same amount (1300 lb/A) of 10-10-10 fertilizer. Yields from plots amended with oak leaves were compared to plots amended with maple leaves and the unamended controls. In 2008, lettuce yields from the control plots and plots amended with oak leaves were slightly greater (1.2 lbs/head) compared to yields from plots amended with maple leaves (1.0 lbs/head). The greatest pepper yields were from the plots amended with maple leaves (6.7 lbs/plant) followed by plots amended with maple leaves and the unamended control plots (6.4 lbs/plant). The greatest carrot yields were from the control plot (11.4 lbs/10 ft row) followed by plots amended by oak leaves (11.1 lbs/10 ft row) and plots amended with maple leaves (10.8 lbs/10 ft row). The greatest onion yields were from the control plot (6.8 lbs/10 ft row) followed by plots amended with oak leaves and maple leaves (6.4 lbs/10 ft row).

Impact: Homeowners can dispose of their oak and maple leaves in their gardens without worrying about any deleterious effects on yields in their vegetable gardens. Incorporating tree leaves into gardens improves the environment by storing carbon in the soil and reducing the volume of material in the solid waste collection and disposal system.

There are more than 50 growers in Connecticut who use greenhouses for vegetable production. Most of this produce is sold by direct retail to consumers from farm stands or farmers' markets. Lettuce and other salad greens are commonly grown in heated and unheated greenhouses. Vegetable producers would like to know the benefit to human nutrition of the crops they grow. They would be eager to adopt practices that would enhance nutritional benefit, if this translated to increased interest and income from Connecticut consumers.

As consumers become more educated regarding the nutritional value of the foods they eat, they will pay more for fresher vegetables and those produced under conditions that maximize nutritional value. Consumers will prefer locally grown produce that is fresh, to that produced and shipped from distant lands. They will prefer to know the conditions under which their vegetables are grown, rather than purchasing produce from distant and anonymous farms. Protected cultivation in greenhouses extends the production season of vegetables in Connecticut beyond the few summer and fall months allowed by open field production. Greenhouse growers can provide locally grown and fresh vegetables to Connecticut consumers year-round.

Dr. Martin P.N. Gent found that the concentrations of nitrate and sugars in lettuce shoot tissue varies from day to night due to the influence of the sun. This diurnal variation may differ according to plant size or the ability to buffer the uptake, synthesis, and use of these metabolites. Three plantings of Bibb lettuce were germinated at 2-week intervals and grown in recirculating nutrient solution in two independent hydroponics systems in a greenhouse with 50% shade cloth.

Plants were harvested at 3-hour intervals from 600 to 2100 hours on 14 August 2007. Sub samples were frozen on dry ice and freeze dried. The dried tissue was extracted and analyzed for soluble sugars and nitrate using LC chromatography. Dry matter fraction of the shoot differed with plant size. Dry matter averaged over all times was 0.091, 0.063, and 0.051 gram dry weight per gram fresh weight, for shoots of 3.5, 55, and 303 g fresh weight, respectively. Dry matter increased over the light period for all plant sizes, but the increase in sunlight was greatest for the smallest plants. Tissue nitrate on a fresh weight basis did not vary with time. The concentration in shoots of small plants, 0.25 mg/g fresh weight, was only half that for the larger plants, 0.46 to 0.49 mg/g. The concentration of soluble sugars on a fresh weight basis was similar for all plant sizes early in the day, about 5 mg/g fresh weight. The sugar concentrations increased until 1500 hours, to 17, 11 and 10 mg/g, for small, medium and large plants, respectively. Soluble sugars were similar for all plant sizes at dawn, but increased two-fold more during the day for small compared to large plants.

IMPACT: By manipulating the environment and fertilization within the greenhouse, it is possible to increase the production and/or the quality of specific compounds in plant tissue that are important for human nutrition. Research in this area has the potential to significantly increase the economic returns for Connecticut greenhouse operations involved in vegetable production.

Winegrape growers and Farm Wineries in Connecticut face many 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 cultivars, and drove up prices for purchasing Connecticut fruit. Little information is available to growers regarding cultural information for growing more cold hardy and disease resistant cultivars in the state. Growers of more traditional cultivars require more information on crop regulation and fruit quality. 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 cultivar selection in newly planted vineyards.

Winegrapes: Studies were initiated by **Dr. William R. Nail** in 2004-2009 to help determine cultural practices for growing high quality winegrapes profitably in Connecticut. The winegrape industry in Connecticut is one of the most rapidly expanding categories of agriculture in the state. The first Farm Winery opened in 1979, and there are currently 22 wineries with a Farm Winery license, with two or three 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, and other establishments 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.

Cultural practices in Vitis vinifera*:* **Dr. 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 in the state, and 101-14, which may tend to ripen fruit earlier and have better tolerance to severe winter freezes.

Impact: Vines grafted to 101-14 had 32% less mortality due to winter freeze damage than those grafted to 3309C following their first winter. Crown gall in subsequent years continues to be slightly higher in 3309C vines. Planting on rootstocks more resistant to winter damage can result in savings of $7.60 for each year of lost production per vine, plus $3.75 replacement cost per vine plus labor involved in removing diseased vines and replanting.

Effects of fruit thinning on red Bordeaux cultivars: Fruit thinning has often been employed as a cultural practice designed to improve fruit quality. Besides a reduction in yield, fruit thinning also requires labor for crop estimation and cluster removal. Indiscriminant fruit thinning without consideration of canopy efficiency may result in reductions in yield without commensurate higher fruit quality. Very vigorous vines of Cabernet Franc, Cabernet Sauvignon, and Merlot were either not thinned or thinned to a target yield of three tons/acre from 2004-2008. Cluster thinning reduced yields, but there were rarely significant differences in any measured fruit quality parameters.

Impact: In vineyards with high vine vigor, thinning could result in losses of over $2,500/acre with no commensurate improvement in fruit quality.

Cultural methods for reducing cluster compactness: Harvest rots are a major problem if climatic 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 rather than being genetic in nature. 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 photosynthetic sources 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, if it were, it is extremely unlikely that a grower would confidently apply an herbicide to their crop. 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.

Dr. Nail applied JMS Stylet oil at trace bloom from 2006-2008 to selected Pinot Gris vines. Single leaf photosynthesis measurements were made before and after application. Inflorescences on clusters opposite the measured leaves were counted prior to application. Photosynthesis was reduced by an average of 18% the day after oil application compared to vines sprayed with water only. Fruit set was reduced on treated vines by an average of 20% in two of three years.

Impact: Harvest rot damage can average 25% in warm, wet ripening seasons. This can result in losses of over $1,000 per acre of lost fruit. By reducing cluster compactness, this loss can be reduced, and may also result in reduced use of fungicides to combat harvest rots.

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. Chardonnay clone 96 budwood was grafted onto 3309C rootstock at standard height and 26 inches higher in 2006, and 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 beginning in 2009.

Impact: Vines with crown gall typically require replacement. Planting on rootstocks more resistant to winter damage can result in savings of $7.60 for each year of lost production per vine, plus $3.75 replacement cost per vine plus labor for vine removal and replanting. High-grafted vines may result in significant reduction in such losses, which would be approximately $2,150 plus labor for each 10% of vine mortality. Funding for this project was obtained from the Viticulture Consortium East for 2006 and 2008-2009.

Training and pruning effects on vine performance of hybrid cultivars: Grapevines in most 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 some 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.

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 unit of linear row length, but are more difficult and labor-intensive to establish and maintain.

To evaluate spacing and training systems for new cultivars, **Dr. Nail** established a new planting of the hybrid cultivars St. Croix and Cayuga White in May, 2005 at a private grower's vineyard in Wallingford. These cultivars are among the most popular hybrids for new plantings. They have different growth habits and management issues than vinifera cultivars, which may involve fundamental issues both before and after planting. Plants of both cultivars were planted at six and eight foot spacings, and were trained to four different training systems beginning in 2009: Vertically Shoot Positioned (VSP), Hudson River Umbrella (HRU), Geneva Double Curtain (GDC), and Scott Henry. Those on six foot spacing will also be pruned to both cane and cordon systems inn future years.

Impact: 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 Connectict.

Pruning systems: Most grapevines in Connecticut have traditionally been cane pruned. Cane pruning requires skilled labor, which is increasingly in short supply. Spur pruning to a cordon system requires skilled labor, which is increasingly in short supply. Spur pruning to a cordon system requires less skilled labor and lends itself to mechanization. A planting of the hybrid cultivars Chambourcin, Seyval Blanc, Villard Blanc, and Villard Noir at Lockwood Farm was rejuvenated in 2004, and vines were either cordon or cane pruned in 2005 through 2009 to compare the relative efficiencies of these pruning methods. Yield and fruit quality parameters were determined beginning in the 2005 harvest season.

Impact: Cordon pruning is a viable alternative to the cane pruning method 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 be monitored through the 2009 growing season to determine if there are differences in long-term vegetative or fruit quality parameters that may influence a grower's decision.

Cultivar and clonal evaluation: Beginning in 2004, **Dr. Nail** has evaluated previously established experimental plots at Lockwood Farm and a private grower's vineyard in Shelton. The planting at Lockwood Farm contains the white hybrid cultivars Seyval Blanc and Villard Blanc and the red hybrid cultivars Chambourcin and Villard Noir. The white cultivars have consistently had higher yields than the red cultivars (7.9 vs. 3.7 tons/acre, respectively). However, red grapes are usually in higher demand due to the cool-climate conditions in Connecticut. The private vineyard plot consists of the red Bordeaux cultivars Cabernet Franc, Cabernet Sauvignon, and Merlot. Cabernet Sauvignon has displayed high vine mortality and relatively poor fruit quality due to lack of maturity. Growers have generally agreed that this cultivar is unsuitable, and no significant new plantings are being established. Cabernet Franc and Merlot have both consistently produced good quality fruit, although yields in Merlot were slightly lower (4.3 vs. 4.0 tons/acre, respectively). While there have been differences sometimes among clone and rootstock performance, growing season effects were more significant. Data will continue to be collected from these vineyards through the 2009 growing season in both vineyards.

Impact: The white hybrid cultivars in question had approximately 50% higher yields than the red cultivars. However, high quality red winegrapes are in higher demand, so they may command a price high enough to justify their production for growers planning to sell their fruit. While Cabernet Sauvignon is not a viable cultivar option, both Cabernet Franc and Merlot have produced good yields of high quality fruit suitable for premium wines.

Crop-tree management: Connecticut's landscape is a quilt of forests, farms, towns, and cities. Most of Connecticut's forests were established around 1900 and have become economically valuable assets. 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 several hundred firms that provide employment to thousands loggers, millworkers, and others.

The unbalanced age class distribution of the oak-hickory forest, and most individual forest stands, presents a challenge to both private and public forest landowners wishing to implement sustainable forest management. Three factors are driving the necessity of developing innovative alternatives to "high-grading" or initiating regeneration harvests in these stands: obtaining a more balanced age-structure, increased public desire for partial cutting, and increased parcelization of ownership. Crop-tree management has been proven successful in younger oak stands and could be a viable alternative in older oak sawtimber stands where maintaining high forest cover and non-commodity attributes are important considerations.

In 1988, **Dr. Jeffrey S. Ward** began a study to examine the effects of precommercial crop tree release (PCTR) on development of sapling red oaks. Crown class at canopy closure, competition from adjacent trees for growing space and limited resources, and interaction of these factors were major determinants of survival, upper canopy persistence, and diameter growth over the 18-yr period studied. Complete release from competition of neighboring trees, but not partial release, increased survival of intermediate and codominant stems. Complete release did not increase survival of oaks in the dominant crown class. Few intermediate and no suppressed oaks ascended into the upper canopy without crop tree release. Complete release doubled the proportion of codominant trees that remained in the upper canopy, and increased the proportion of intermediates that ascended into the upper canopy. Complete release increased 18-yr diameter growth only for dominant and codominant oaks. Because precommercial crop tree release simultaneously increases the probability that high quality stems of desired species will be present in the mature stands and increases the diameter growth of those stems, this technique should be considered in stands with low oak densities.

By reducing competition for growing space and limited resources from neighboring trees, precommercial crop tree release can increase survival, upper canopy persistence, and diameter growth of oak saplings during early stand development. Managers may be reluctant to implement a PCTR because of the long time interval before a financial return is realized, i.e., until the first commercial thinning. However, because the majority of the value in a mature hardwood stand is concentrated on 125 or fewer stems/ha, then precommercial crop tree release can be thought of as a means of both increasing the probability that high quality stems of desired species, specifically oak, will be present in the mature stands and increasing the diameter growth of released stems.

Impact: The increased diameter growth will decrease the time needed to reach minimal diameter of grade or veneer sawtimber should optimize potential stand value and resultant in at least a 4% real rate of return.

Two major threats to natural preserves and managed forests are exotic plant species and browsing by overabundant white-tailed deer (*Odocoileus virginianus*). Therefore, scientists in the Department of Forestry and Horticulture are examining both effects of these two threats, and possible strategies to minimize their impacts and thereby enhance forest ecosystem services.

Deer Repellent Study: **Drs. Ward and Scott C. Williams** completed 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*) were planted in 2006. Twelve yews at each site received one of twelve treatments (the ten different repellents, a fence, and untreated control). Manufacturers' instructions for repellent application are being followed.

In general, repellents that required more frequent application performed better. Bobbex® ranked highest, but was the most expensive repellent treatment. Hinder® performed nearly as well at a fraction of the cost. Yews protected by Repellex®, Deer Solution®, coyote urine, and Plantskydd® were the same size as unprotected controls at both sites and did not have significantly more needles. Repellents cannot prevent 100% of browse damage. The choice of repellent usage is a trade-off between effectiveness, costs, ability to follow recommended reapplication interval, and crop/plant to be protected.

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.

Japanese barberry control: Japanese barberry, listed as invasive in 20 states and 4 Canadian provinces, is associated with enhanced population densities of blacklegged ticks that can transmit the causal agent of Lyme disease. **Drs. Ward and Williams** continued their studies of alternative methods to control Japanese barberry begun in 2006. This research both evaluated the effectiveness and relative costs among treatment combinations to control Japanese barberry, and by monitoring individual clumps across a range of size classes, assessed whether treatment prescriptions are dependent on clump size.

From March 2007 through July 2008, a two-step process to control barberry was studied using a total of 1100 clumps at six study areas. 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. Initial treatments in spring 2007 (prescribed burning, mechanical mowing with a brush saw or drum chopper) reduced the size of established barberry clumps. Follow-up treatments in mid-summer 2007 to kill new ramets that developed from surviving root crowns were foliar application of triclopyr or glyphosate, directed heating with a propane torch, and untreated

controls. Mortality was defined as the absence of ramets from a root crown and not the mortality of individual ramets of a given clump.

Clump mortality and size of new ramets did not differ among initial treatments. However, by July 2008, larger clumps had higher survival and larger sprouts than smaller clumps. Effectiveness of follow-up treatments varied by clump size. Two follow-up treatments of directed heating using propane torches were as effective as herbicides for clumps that were initially smaller than 120 cm. For clumps with pretreatment sizes of 120 cm and larger, clump mortality following herbicide treatments (90%) and directed heating (65%) was greater than for clumps that had no follow-up treatments (35%). While clump sizes in July 2008 did not differ between follow-up treatments; both follow-up treatments resulted in smaller clumps than for untreated controls.

Effective control of Japanese barberry can be achieved in a single growing season by integrating an early-season initial treatment (prescribed fire or mechanical) that kills the aboveground tissues with a mid-season follow-up treatment such as directed heating or targeted herbicide application..

Impact: Developing a cost-effective method of controlling Japanese barberry will allow large land owners to maximize the area treated each year. This research was partly funded by the Regional Water Authority, Aquarion Water Company, The Nature Conservancy, Norcross Wildlife Foundation, Town of Greenwich, Town of Mansfield, and Providence (RI) Water. They collectively manage over 70,000 acres that include extensive areas of barberry. Additional funding has been provided by the Propane Education and Research Council and Propane Gas Association of New England.

Propane torches have been purchased to control barberry on lands managed by Connecticut DEP-Wildlife Division (22,000 acres), Colebrook Land Conservancy (566 acres), Northern Connecticut Land Trust (435 acres), New Hartford Conservation Commission (171 acres), and numerous private forest owners. Requests for information about this technique have also been received from the USDA Forest Service (Pennsylvania and New Hampshire), NRCS (Connecticut and Rhode Island), New York City – DEP Bureau of Water Supply, Moosehorn National Wildlife Refuge (Maine), Anacostia Watershed Society (Maryland), private natural resource managers, and the general public.

Japanese Barberry Infestations as a Refuge for Blacklegged Ticks: In many Connecticut forests with an overabundance of white-tailed deer (*Odocoileus virginianus*), Japanese barberry (*Berberis thunbergii*) has become the dominant understory shrub. This exotic invasive shrub provides habitat favorable to the blacklegged tick (*Ixodes scapularis*) and white-footed mouse (*Peromyscus leucopus*) survival. To determine mouse and larval tick abundances at three replicate sites over two years, **Drs. Williams** and **Ward** trapped mice in unmanipulated dense barberry infestations, areas where barberry was controlled, and areas where barberry was minimal or absent. The number of feeding larval ticks/mouse was recorded. Adult and nymphal ticks were sampled along 200m draglines in each treatment, retained, and in **Dr. Stafford's** lab, were tested for the presence of *Borrelia burgdorferi*, the causal agent of Lyme disease in humans and pets.

The number of captured mice did not differ between treatments. However, the average number of feeding larval ticks per mouse was highest on mice captured in dense barberry (9 larvae/mouse). Adult tick densities in dense barberry (274/acre) were higher than in both controlled barberry (83/acre) and no barberry (37/acre) areas. Ticks sampled from full barberry infestations and controlled barberry areas had similar infection prevalence with *B. burgdorferi* the first year, but in areas where barberry was controlled, infection prevalence was reduced to equal that of no barberry areas the second year of the study (an 18% reduction). The combination of fewer ticks and a reduction in *B. burgdorferi* infection prevalence in areas where barberry was controlled resulted in a more than 3-fold decrease in the density of *B. burgdorferi* infected blacklegged ticks compared to unmanipulated dense barberry areas.

Results indicate that managing Japanese barberry will have a positive effect on public health by reducing the number of *B. burgdorferi* infected blacklegged ticks that can develop into motile life stages that commonly feed on humans. Mouse trapping and tick sampling efforts will continue for several more years to monitor long term effects of controlling Japanese barberry.

Impact: Japanese barberry is an exotic invasive plant that overwhelms the forest shrub layer and virtually eliminates other native plants. In addition, it harbors increased abundances of blacklegged ticks infected with diseases that can be transmitted to humans. Managing barberry infestations can improve the health of forests and the citizens of the State of Connecticut.

Interaction of Deer Browse and Barberry Infestations: The Japanese barberry (*Berberis thunbergii*) 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, **Drs. Scott C. Williams** and **Jeffrey S. 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. Each of the three treatments had an adjacent unfenced plot. For each treatment (total of six), regeneration and herbaceous vegetation was sampled using ten 4-m^2 circular plots (sixty plots total) in fall 2007, spring 2008, fall 2008, and spring 2009. Vegetation will be continually sampled over multiple growing seasons. This study will determine whether it is white-tailed deer, Japanese barberry, both, or neither limiting native species regeneration throughout Connecticut.

Impact: Both Japanese barberry and white-tailed deer are invasive species that have detrimental impacts on Connecticut's native forested ecosystems. A better understanding of the interaction between the two species can be used to promote improved forest health throughout the State.

The Japanese Barberry Infestation Microclimate: In Spring 2008, two additional Japanese barberry management plots were established in Redding and North Branford, CT. Each plot was approximately 5 acres in size and Japanese barberry was controlled by **Drs. Williams** and **Ward** and **J.P. Barsky** using 400,000 btu propane torches. This control strategy differs from previous efforts in that dead Japanese barberry plants remained standing instead of being removed

altogether. Based on previous results, **Dr. Ward** hypothesized that dense Japanese barberry infestations retain humidity, resulting in increased abundances of blacklegged ticks, which require stable and humid conditions to survive. To investigate this hypothesis, temperature/relative humidity sensors were deployed from June-December 2008 and again in 2009 in areas where barberry was controlled, areas where barberry was not controlled, and areas where barberry was virtually absent. In addition, blacklegged ticks and white-footed mice have been continually sampled during sensor deployment both in 2008 and presently in 2009. Preliminary sensor data analysis from 2008 has revealed that unmanaged Japanese barberry infestations provide excellent habitat for blacklegged tick survival because, due to their closed canopy-like growth form, they retain more of the humidity from the previous night throughout the following day than do areas where barberry was controlled or absent. In addition, the Japanese barberry canopy buffers temperature and relative humidity swings throughout the day, providing a more stable microclimate than areas where barberry was controlled or absent. Because blacklegged ticks have a relatively high surface area to volume ratio, they are prone to desiccation, and as a result, need a continually humid and stable microclimate to survive, which the exotic invasive Japanese barberry appears to provide. Sensors will be retrieved at the end of 2009 and ticks and mice will continue to be sampled.

Impact: Japanese barberry is an exotic invasive shrub that limits native species regeneration. In addition, its unintended introduction into the Northeast has altered native ecosystems and it also provides a favorable microclimate for blacklegged tick survival, further exposing members of the Connecticut public to the agents that cause Lyme disease.

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 white-tailed deer (*Odocoileus virginianus*) browse to unprotected plots. **Drs. Williams** and **Ward** are collecting vegetation data within sixteen deer exclosures and sixteen adjacent control plots throughout the state. Deer exclosures prevent deer from accessing vegetation within. Growth rates and species diversity of enclosed vegetation are 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 (and adjacent control plots), at Burnham Brook Preserve in East Haddam, the Bingham Easement in Salem, 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. Plots have been sampled for herbaceous species cover in the spring of 2006, 2007, 2008, and 2009. Late summer sampling was conducted in 2005, 2006, 2007, and 2008 and included all woody and herbaceous plants. Preliminary data analyses indicate that herbaceous cover within exclosures is greater than control plots. Density of tree seedlings at least two feet tall is twice as high within exclosures compared to control plots. All locations will be resampled for both woody and herbaceous vegetation in late summer 2009. Results from this study will reveal plant species composition and growth rates in the absence of browsing deer.

Impact: Overabundant white-tailed deer are negatively impacting forest health by altering species composition due to selective and over-browsing habits. Over time, this process will significantly reduce stand and land values of forestlands in Connecticut.

Deer Vehicle Collisions in Connecticut: Annually, the Department of Environmental Protection receives approximately 3,000 reports of vehicle collisions with deer on Connecticut roadways. But because of poor reporting rates, the DEP estimates there are an estimated 18,000 that occur annually. Regardless of the exact number, it is evident that deer pose a significant threat to Connecticut motorists' health and personal property. There has been abundant research on different strategies of reducing deer-vehicle collisions by altering either motorist or deer behavior, which has met with limited success. However, there is limited research on the behaviors of deer proximate to roadways and how deer integrate roads into their home ranges. In the interest of discovering deer behaviors that could be targeted in an attempt to reduce collisions with vehicles, **Dr. Williams** has begun to capture deer on a privately-owned piece of property that is bisected by State Route 15 (The Merritt Parkway) in Greenwich. Captured deer will be fitted with ear-tags and global positioning system collars, which record precise locations of deer throughout the year. Once data are obtained from GPS collars, an analysis of deer movements across different seasons, times of day, during different weather events, etc. can be conducted to better understand how, when, and where deer cross roads. Deer capture commenced in the spring of 2009, resulting in 5 deer captured and collared. Capture efforts will again resume in fall 2009.

Impact: An understanding of deer behaviors proximate to roadways will allow engineers and public transportation agencies to better target deer-vehicle collision abatement attempts which will ultimately save lives and injury to motorists traveling on Connecticut roadways.

GRANTS AND CONTRACTS OFFICE

The Grants and Fundraising Office was established to support Station scientists in seeking additional funding from government and foundation sources. Tess Foley is the Grants and Contracts Manager. In this capacity, she assists Station scientists to identify, prepare, submit, and track grant submissions. She also provides project management support to help organize some funded grant projects. She works to establish strong relationships with corporate and private foundations on behalf of the Station.

In the first 8 months of 2009, Ms. Foley has assisted Station scientists in preparing and submitting 64 grant proposals. At this point in the year, this grant funding totals over $610,000 received for Station research projects. Competitive grant proposals are being submitted from all departments.

During the past year, Station scientists have successfully received grant funding from the United States Department of Agriculture (USDA), the Connecticut Department of Agriculture, The National Science Foundation, USDA Forest Service, U.S. Environmental Protection Agency, Centers for Disease Control and Prevention, Cooperative State Research, Education and Extension Service (SCREES), Agriculture and Food Research Initiative, Sustainable Agriculture Research and Education, The Community Foundation of Greater New Haven, Propane Education Research Council; Propane Gas Association of New England, Norcross Wildlife Foundation, Aquarion Water Company, First Light Power Resources, The Nature Conservancy, and the Eastern Apiculture Society, among others.

Tess Foley has assisted in securing the funding that will help promote research in projects involving girls' science education, crop farming, honey bee and bluebird conservation, CT's new vineyard industry, environmental remediation, forestry preservation, and support for people in need of food assistance in Connecticut.

Through these new relationships, Station scientists have participated in events in Connecticut including Sikorsky Aircraft Corporation's Earth Day Event, a National Science Foundation STEM Girls' Education Conference, and the CT Folk Music Festival Green Expo, sponsored in part by the Connecticut Culture and Tourism Commission. The Experiment Station's "New and Ethnic Crops Research Program" partnered with the Produce for Better Health Foundation to direct-man an informational to more than 500 farmers in the State of Connecticut.

The Station's newly founded non-profit 501(c)(3) organization, The Connecticut Agricultural Experiment Station Research Foundation, is in operation, providing Station scientists with the ability to seek financial support from sources that only fund non-profit organizations. This new Research Foundation has successfully received funding from the Connecticut Department of Agriculture, Propane Education Research Council, the Propane Gas Association of New England, The Nature Conservancy, Norcross Wildlife Foundation, Webster Bank, and The Community Foundation of Greater New Haven, among others.

The CAES Research Foundation looks forward to continuing to develop strong relationships with individual donors and corporate and philanthropic foundations to advance the Station's research.

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. Staff members 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, disease management guides, 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

Integrated Pest Management for Winegrapes in New England

Dr. Francis J. Ferrandino is continuing his work on diseases of winegrapes. This involves both an extension and a research component and is being accomplished through a collaboration of scientists and technicians at CAES, and the Universities of Connecticut, Massachusetts, and Rhode Island., Between December 2008 and April 2009, 7 cell phone-based, remote-access weather stations have been deployed in vineyards throughout southern New England (Hamden, CT; Windsor, CT; Griswold, CT; New Preston, CT; Colchester, CT; Newport, RI; and Deerfield, MA). These weather stations measure temperature, relative humidity, sunlight, wind speed and direction, rainfall, leaf wetness, and soil temperature every 15 minutes. The data are sent back to a central location once per hour where it is accessible via the Internet. The resultant data are used to calculate disease risk assessment reports, which are made available to growers via Internet postings and direct Email alerts. Onsite weather station data are used to calculate disease risk assessments, which are delivered to the winegrape growers on a weekly basis.

In addition, Dr. Ferrandino and his collaborators are keeping track of maturation dates for various grape cultivars (Chardonnay, Vanessa) over the study area, as well as the date of disease onset and epidemiological development of the various grape diseases. The aerial concentration of airborne inoculum is sampled using suction traps and potted grape vines.

Together with the weather data, this information will help us evaluate current disease risk models and may suggest improvements suited to our local climate. Three research vineyards have been established at Hamden, CT; Windsor, CT; and at Griswold, CT.

Weather station deployed at the edge of a Chardonnay vineyard in Newport, RI. This Station is equipped with sensors that measure leaf wetness. Probes that measure soil moisture and soil temperature are channeled through underground plastic pipe into the vineyard so that spraying operations are not hampered.

Burkard 7-day spore trap deployed at the Valley Laboratory vineyard in Windsor, CT. Microscopic examination of plastic film exposed in the trap provides hourly information of disease spores adrift in the air within the plant canopy.

Impact: The timely dissemination of inoculum development information to growers will allow them to eliminate unnecessary foliar sprays. This will increase the competitiveness of the winegrape crop in Connecticut.

Use of mathematics to describe spread and development of plant diseases

Dr. Ferrandino is continuing his mathematical investigation of the role of disease aggregation on the measurement of plant disease levels and the resultant effects on the disease spread and development. Diseases tend to occur in localized "hot spots" in the planting due to the limitations of mechanical spread of inoculum, the weather-dependent episodic nature of spore release, and the age-dependent nature of susceptibility. For this reason, only leaves that are at the right age at the right time and near enough to a source of spores become heavily infected. The clumped nature of disease must be accounted for when drawing inferences from disease severity observations.

Impact: Appropriate analysis of aggregated data provides additional information impossible to obtain by employing conventional parametric statistics.

Environmentally-friendly control of powdery mildew on landscape plants

Dr. Ferrandino is continuing his work on environmentally-friendly controls of powdery mildew on common home landscape plants (e.g., lilac, deciduous azalea, monarda, phlox, peony, rudbeckia, and zinnia). The alternatives to conventional chemical controls include sprays of cow's milk, compost tea, horticultural oil, and potassium bicarbonate products. Last year's

results suggest that stylet oil offered the best protection--it delayed the time when 50% of the lilac leaves were infested by three weeks. Other species had very low incidence of powdery mildew last year.

Impact: The use of efficacious, environmentally-friendly foliar sprays to control powdery mildew will reduce the chemical load on the environment. This is especially valuable around the home.

Biocontrol with earthworms

Dr. Wade H. Elmer conducted a series of greenhouse and field studies with asparagus, eggplants, and tomatoes that were grown in soils infested with soilborne pathogens and earthworms (*Lumbricus terrestris).* In each host-disease system, earthworm activity was associated with more plant growth, higher yield, less root disease, and a 10- to 12-fold increase in beneficial bacteria called fluorescent pseudomonads in the root zone. Fluorescent pseudomonads suppress disease via antagonism, competition, and/or by inducing resistance. To test whether earthworms can induce resistance to foliar bacterial pathogens on pepper, **Drs. Elmer** and **Balogh** established field plots at Lockwood Farm and exposed the soil in each plot to earthworms. Disease severity will be compared to plots not treated with earthworms, plots that will be sprayed with bactericides, and to plots that received both bactericides and earthworms. The study is in progress.

In perennial plantings where root systems cannot be easily manipulated after planting, earthworms might be used to provide delivery of biological control organisms to the root zone. To study this idea, Drs. Elmer and Balogh produced an antibiotic-resistant strain of the beneficial soil bacterium, *Pseudomonas fluorescens.* Initial studies have demonstrated that it can survive well in natural soil for over 9 weeks and can be easily recovered on antibiotic-selective agar. When the bacterium was allowed to grow on ground, autoclaved millet and then placed on the surface of soil that filled long cylinder pots that were augmented with earthworms, the earthworms readily fed on the colonized millet. Soil sampled from the top, middle, and bottom of the pot was diluted and placed onto antibiotic-selective agar. Earthworms distributed the bacterium to the lower regions in slightly greater densities than in pots where no earthworms were placed. Future experiments are planned to test the hypothesis that earthworms could move biological control agents to the root zones of plants in densities high enough to achieve root disease suppression.

Impact. These studies suggest that strategies to increase earthworm densities in soil will improve soil health, suppress soilborne diseases, and may provide environmentally-friendly and sustainable suppression of foliar pathogens.

Fusarium ecology on corn stubble

A long-term study on the incidence of *Fusarium graminearum*, a fungus that produces carcinogenic mycotoxins in grain, was continued by **Drs. Elmer** and **Ferrandino** in 2008-2009. This project studied the corn agroecosystem where the dominant *Fusarium* species from corn stubble was the toxin-producing species, *F. graminearum,* which comprised 30% of the isolates. In collaboration with **Dr. Robert Marra**, assays are being conducted to further characterize this species and to identify a unique, more toxic chemotype called 3-ADON, which represented 20%

of the *F. graminearum* isolates. Although we hypothesized that the 3-ADON chemotype might increase in Connecticut's cornfields faster than the 15-ADON isolates, our molecular surveillance suggests the chemotype may be stable and possibly declining. DNA from isolates from 2008 has been extracted and stored for analyses. Sampling and surveillance will continue in 2009.

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

Biochar research

Effect on allelochemicals and root disease:

Biochar is a fine-grained charcoal produced from the pyrolysis of plant and waste feedstocks at temperatures between 350 and 700 °C. It is also produced for the purpose of extracting renewable oils and gases during the pyrolysis process. Biochar is "carbon negative," since it serves as a withdrawal of atmospheric carbon dioxide and then persists as a highly recalcitrant store of carbon that is resistant to further oxidation. Biochar possesses tremendous absorptive properties as well as increases nutrient retention in soil. **Drs. Elmer, Pignatello,** and **White** hypothesized that soils contaminated with chemicals (e.g., allelochemicals, pesticides, toxic waste) might be restored to productivity if amended with biochar. Allelochemicals are compounds released from plants like asparagus and walnuts that are toxic to plants. Dr. Elmer found that asparagus plants grew better and had less Fusarium crown and root rot disease when grown in soil contaminated with allelochemicals and amended with biochar than in soil without biochar. Artificially contaminating the soil with toxic allelochemicals (phenolic acids) significantly reduced root colonization by beneficial mycorrhizae, but this effect was negated when biochar was added. Similarly, tomato seedlings are highly susceptible to juglone, an allelochemical excreted from walnut tissues. However, when tomatoes were grown in soil amended with biochar and drenched with juglone, plants were larger than plants grown without biochar. Ongoing studies are comparing two different types of biochar that differ in original feedstock, production temperature, and texture. Preliminary studies found that the more finely ground biochar was more effective in reducing disease. These studies indicate that biochar may serve as a potential tool in agriculture to improve crop health and allow usage of contaminated soils.

Pieces of asparagus roots on agar that is selective for *Fusarium* spp. The Petri dish on the right contains roots from a plant grown in soil amended with biochar and the dish on the left contains roots from a plant grown in soil that was not amended, which shows more *Fusarium* colonies and more infection.

***Impact*:** The development and production of biochar may eventually serve to provide fuel, reduce atmospheric CO_2, and enhance crop health and production in contaminated soils.

Ornamental disease research

Fusarium corm rot of gladiolus:

Fusarium corm rot is an ubiquitous disease of gladiolus caused by *Fusarium oxysporum* f. sp. *gladioli* and is the most destructive root disease of gladiolus. Ongoing research by **Dr. Elmer** found that a 20 min soak of corms in solutions of specific chemicals could provide season-long suppression of Fusarium corm rot. In 2008, we found that combining Actigard 50 WP with a nonpathogenic strain of *Fusarium oxysporum* (CS-20) did not increase the number of flower spikes or affect disease. The study is currently being repeated with increasing concentrations of Actigard 50 WP with and without other fungicides.

Gladiolus corm showing signs of Fusarium corm rot. (Photo by Peter Thiel)

***Impact*:** This research demonstrates the potential for a strategy that may provide an economically efficient management tool with reduced pesticide exposure to the environment for Fusarium corm rot, considered the most difficult disease to control in gladiolus production.

Suppressing Pythium root rot with Partial Soil Saturation in a Flooded Floor Greenhouse:

Ebb and flow recycled watering systems have gained more use in Connecticut greenhouses. A major disadvantage is the potential for disease outbreaks and the development of fungicide-resistant pathogens. A flooded floor greenhouse was built at Lockwood Farm in 2007 and designed with two floors that drained at different rates. Each floor had separate reservoirs. **Drs. Elmer** and **Gent** studied the spread of Pythium root rot on chrysanthemums, poinsettias, and geraniums. A single row of plants were inoculated with either *Pythium aphanidermatum* or *P. ultimum* and placed on the floor with healthy plants. Periodic sampling and filtering of the irrigation water was done to monitor the presence of *Pythium*. At final harvest, plants were rated and weighed. In all trials, the pathogen could be recovered on both floors, but plants receiving partial saturation had less root rot and were generally more compact and marketable than plants that received full saturation. Partial saturation also reduced the amount of fertilizer, fungicides, and inoculum returned to the reservoir tank.

Impact: Partial saturation offers great value to growers who use ebb and flow irrigation systems by saving fertilizer, fungicides, and producing more marketable plants with longer shelf lives.

Station scientists and staff evaluating plants grown under partial saturation or normal irrigation. From left to right: Dr. Wade Elmer, Obinna Aduba, Mike Short, and Dr. Martin Gent. (Photo by Peter Thiel)

Sudden Vegetation Dieback

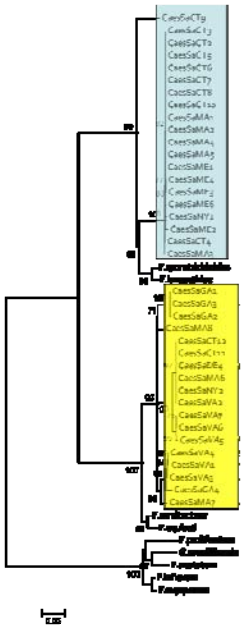
Sudden Vegetation Dieback (SVD) has continued to appear along Connecticut's Long Island Sound. New sites and expansion of old sites was noted in 2009. Although the cause is not clear, plant pathogens were presumed to play a role. **Dr. Elmer** found that *S. alterniflora* (SA) plants in SVD sites had a higher incidence of *Fusarium* spp. colonizing the leaves, stems, and roots than plants from healthy marshes. Isolations for *Fusarium* spp. were made from leaves, stems, and roots from plants from 12 SVD sites and 5 healthy marshes in 2007 and from 17 SVD sites and 6 healthy marshes in 2008. We found significantly more colonies of *Fusarium* spp. on tissue from SVD sites than healthy marshes in 2007 and 2008. The survey is being repeated in 2009. Over 200 isolates of *Fusarium* sp. obtained from SVD sites in CT, DE, GA, ME, MA, NY, and VA were separated into pathogens and nonpathogens. Additionally, in collaboration with **Dr. James LaMondia** of CAES, we found a root-knot nematode (RKN) in SVD sites. When we studied the interaction of the RKN and *Fusarium* on SA in the greenhouse, we found that more disease was present when both pathogens were added. We also investigated the interaction of drought and flooding with and without *Fusarium* inoculation of SA and found that the combination of drought and *Fusarium* led to higher mortality than drought alone. In contrast, *Fusarium* inoculations with increasing levels of salinity caused no more damage to SA

than salinity alone. Experiments that combine drought, salinity, and *Fusarium* are in progress to determine if a combination of stressors is necessary to cause an SVD event.

Sampling *Spartina* plants for plant pathogens along a tidal creek in Madison, Connecticut, where Sudden Vegetation Dieback has been observed.

Phylogenetics of *Fusarium* species isolated from *Spartina alterniflora* and associated with Sudden Vegetation Dieback (SVD) in marshes:

The majority of *Fusarium* isolates obtained by **Dr. Wade Elmer** from *Spartina alterniflora* in SVD sites ranging from Georgia to Maine could not be assigned to known species of *Fusarium*, and therefore have been analyzed phylogenetically by **Dr. Robert Marra**. Pathogenicity tests conducted by Dr. Elmer on *S. alterniflora* in greenhouse experiments resulted in these isolates being identified as either pathogens or nonpathogens. In order to determine the phylogenetic placement of these isolates, Dr. Marra, with the assistance of Mr. Jason Corwin, sequenced three nuclear genes (β-tubulin, calmodulin, and translation-elongation factor 1-α) in 20 pathogenic and 18 nonpathogenic isolates representing the breadth of geographic distribution of the study sites. The analysis included nine outgroup species, four of which did not have sequences for these genes available on Genbank; therefore, Dr. Marra obtained these sequences directly. Dr. Marra edited and aligned these sequences, then performed bootstrapped maximum parsimony (using MEGA4 software) and maximum likelihood (using PhyML) analyses on the aligned sequence datasets for each gene individually as well as on the combined gene dataset. Finding no topological discordance among the individual gene trees confirmed the robustness of the data and the appropriateness of using the combined three-gene dataset in the phylogenetic analysis. Because the results of this analysis corroborate data from morphological observations and pathogenicity tests, Drs. Marra and Elmer conclude that the pathogenic isolates represent a new previously undescribed *Fusarium* species that is likely closely related to *F. langsethiae* and *F. sporotrichioides*. The nonpathogenic isolates may be a single species or two or more closely related species, as a group closely related to *F. incarnatum* and *F. equiseti*.



Maximum likelihood phylogenetic analysis of the combined three gene (β-tubulin, calmodulin, and translation-elongation factor 1-α) dataset from pathogenic (highlighted in blue) and nonpathogenic (highlighted in yellow) *Fusarium* species isolated from *S. alterniflora* in SVD sites. Numbers above the branches indicate the relative support, expressed in percentages, for the clade. Maximum Parsimony analysis resulted in nearly identical groupings, with strong (>80%) bootstrap support at the nodes.

***Impact*:** Loss of wetland flora like *Spartina* has drastic implications for coastal ecology and marine life, shellfish industries, and property values. Deciphering the role of pathogenic microbes may lead to a better understanding of the events that lead to an SVD event.

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

Dr. Robert Marra's research on Perennial Canker (also known as Neonectria canker) focuses on the ecology and genetics of the 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, particularly black birch (*Betula lenta*). Fundamental knowledge of the natural history of *N. ditissima* is lacking, yet is an essential prerequisite to the development of an effective control strategy for Perennial Canker. To that end, Dr. Marra's research program has developed field techniques and laboratory tools necessary to undertake a study of this organism and the disease it causes, focusing particularly on the use of classical and molecular genetics to elucidate mating structure and the ecology of spore dispersal. Cultures obtained from infected bark and wood from various parts of Connecticut and the eastern United States have been grown to pure culture and analyzed microscopically for key morphological features. DNA extractions, obtained from cultures, are being analyzed using genetic markers in order to determine (1) if fruiting bodies 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 shed light on the fungus' dispersal patterns, a critical precedent to the development of a biocontrol program.

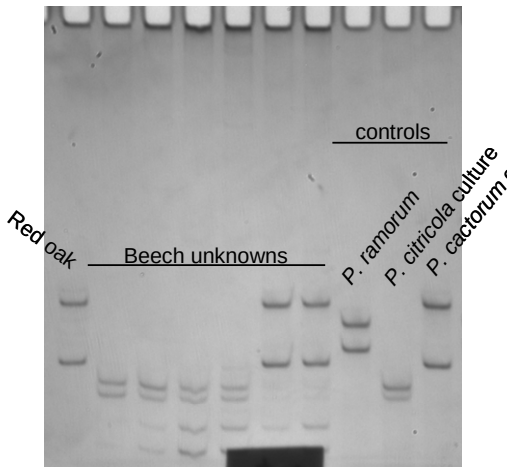
This research has used two categories of molecular genetic markers in the past: Amplified Fragment Length Polymorphism (AFLP) markers and microsatellites. Research over the past year has demonstrated that the microsatellite markers developed in the laboratory in the preceding year reveal a high degree of polymorphism in the current study site. Microsatellites are chains of repeating DNA motifs (e.g., acgacgacgacgacg) found throughout the genomes of most eukaryotes; variation in the number of motif repeats at a microsatellite locus underlies the

length differences among alleles. Unlike AFLPs, microsatellites are always codominant – i.e., each allele is uniquely identified by its length – and their location in the genome is anchored by unique DNA sequences flanking them. Dr. Marra's lab has succeeded in identifying a total of 17 microsatellite loci that are polymorphic and informative; three of these were newly identified in 2008. Fifteen of the microsatellites have been demonstrated to be polymorphic within a single Connecticut population sample of 38 isolates, from West Rock Ridge State Park (WRRSP). The number of alleles at each locus segregating among the WRRSP isolates ranged from two to 12.

Impact: Due to its increasing abundance in Connecticut, black birch is a tree of growing importance and concern. Although trees infected with Perennial Canker can persist for decades, the extensive scarring caused by the cankers renders them of little value for lumber or veneer. Our efforts to more fully understand the biology and natural history of *N. ditissima* will contribute to the identification and utilization of control strategies.

Identification of Bleeding Canker of European Beech

Dr. Marra responded to concerns from Connecticut arborists about European beech trees with bleeding cankers. The objective was to develop a protocol to efficiently detect and confirm the presence of *Phytophthora* species associated with bleeding canker, *P. citricola* or *P. cactorum*. Trees at five different locations were sampled in the New London area; all had bleeding cankers and signs of flagging. Samples were surface-sterilized and transferred to selective media, and were also immediately processed in a novel way, involving lyophilization of cankered bark and wood, followed by a modified DNA extraction protocol. Extracted DNA was then assayed using an SSCP protocol that identifies species within the *Phytophthora* genus. Results from these tests distinguished between trees having no *Phytophthora*, only *P. citricola*, only *P. cactorum*, and or both. Dr. Marra also tested a bleeding canker on a red oak that was brought in by an arborist, and it proved to be infected with *P. cactorum*. In contrast, only two of the bark samples yielded Phytophthora cultures, one *P. cactorum* and the other *P. citricola*. This work demonstrated the utility of the SSCP protocol in establishing the presence of *Phytophthora* species, and will be important to arborists needing confirmation of diagnosis before recommending treatment.



A silver-stained SSCP gel showing ITS DNA amplified from several of the bleeding cankers sampled from New London European beeches and a red oak. Controls on the right are used as reference. The banding patterns of the unknowns show that four of the beeches were infected with *P. citricola*, and two beeches and the red oak were infected with *P. cactorum.*

***Impact*:** For aesthetic and historical reasons, European beeches are among the most highly prized trees in the urban and suburban landscapes, particularly in parks and estates, where some trees are as much as 300 years old. Bleeding cankers caused by *P. citricola* and *cactorum* are turning up with increasing frequency on European beeches throughout the eastern United States, and left untreated can kill a tree. Phosphorous acid treatment, either as a bark or soil drench, or as a bark injection, appears to be effective in treating trees infected with these pathogens. However, because of its expense, it is important for arborists and their clients to first know whether or not the bleeding canker is indeed caused by Phytophthora. For this reason, the SSCP assay, because of its quick turnaround time, has already proven to be an important service to our stakeholders.

Pestalotiopsis from tree peonies

Dr. Marra isolated *Pestalotiopsis paeoniicola* from a field-grown tree peony (*Paeonia suffruticosa*) obtained from a Connecticut grower. Dr. Marra was assisted by **Dr. DeWei Li** in the identification of this species, a pathogen of tree peony that has never been reported outside of China. Molecular sequence analysis of the ribosomal DNA region as well as the nuclear beta-tubulin gene (both sequences deposited in GenBank) was not informative phylogenetically. However, Koch's Postulates were satisfied and demonstrated that the isolates were indeed pathogens of tree peony.

***Impact*:** The identification of *P. paeoniicola* in field-grown plants in Connecticut is important to the tree peony industry, as it establishes that the pathogen is already present in North America, and therefore should not be a reason for quarantine should the pathogen turn up on imported material. Additionally, this first report establishes a baseline, from which future work studying the prevalence and distribution of the pathogen, as well as its host range, can be initiated.

Ramorum Blight/Phytophthora ramorum

Drs. Marra, Douglas, and **Balogh** have been supervising the implementation of the laboratory component of the USDA-mandated assays for detection of *Phytophthora ramorum* on nursery material shipped from California, Oregon, or Washington. National nursery surveys, in addition to trace-forward and trace-back surveys, are conducted in cooperation with **Dr. Victoria Smith** and state inspectors. The laboratory testing 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 and analyzed for *P. ramorum*-specific nucleotide sequences. Drs. Balogh and Marra were certified in the 2009 Proficiency Testing Program for conventional and realtime PCR.

***Impact*:** *Phytophthora ramorum* is a pathogen of regulatory concern and a growing concern in Connecticut because of the numerous species of plants and trees common in Connecticut that are known or suspected hosts. Much of this concern centers on the potential impact of this disease on Connecticut's significant nursery industry (over $1 billion in annual production) and on our forests and landscapes, which also contribute significantly to the state's economy. 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. Additionally, the molecular diagnostic techniques being used and under development at the Station will continue to enhance the disease diagnostics services provided to Connecticut's stakeholders.

Chestnut Breeding for Orchard and Timber Trees

Dr. Sandra Anagnostakis is planting chestnut hybrids (with resistance to chestnut blight disease) in forest clear-cuts, and keeping the native American chestnuts in the area alive by treatments with hypovirulent strains of the chestnut blight pathogen. This will allow crossing to occur between the planted hybrids and the native trees. The goal is to obtain a population of timber chestnut trees resistant to blight and adapted to the local niche. Seed from 2007 was raised for us by a nursery in Georgia, and one-year-old seedlings were planted Spring 2009 at the Griswold Research Center (780 trees). These will provide seed for future forest plantings in the state. Two hundred other trees were planted at the Greentree Foundation on Long Island, 200 at the Belding Wildlife Management Area in Vernon, CT, and 100 at our substation in Windsor. The Mapleridge Community in Hudson Valley, NY, was given 150 trees for an experimental orchard planting, and volunteers from the Southbury Landtrust in Southbury, CT, planted 25 trees. An additional 500 trees were planted in the Yale Forest by former Station employee Cornelia Pinchot, who will follow their growth and disease resistance. This year, many new crosses are being made for more detailed information on the genetics of chestnuts. In addition, crosses with Ozark chinquapins were made to try to improve resistance of this threatened species to chestnut blight disease.

Dr. Sandra Anagnostakis prunes the roots of a chestnut seedling before planting at the Griswold Research Center. (Photo by P. Sletten)

Impact: The overall impact of the project will be to further progress toward restoration of American chestnut as a tree in North American forests and to support the utilization of chestnut as a specialty nut crop for the American marketplace.

Pamela Sletten measures a 6-year-old Ozark chinquapin (10 ft) with good timber form at Lockwood Farm.

Butternut Trees in Connecticut

Butternut populations are declining throughout the native range, due to an exotic fungus that caused lethal cankers. To date, we have only found this pathogen (*Sirococcus*) twice in CT. Since pure butternuts readily cross with different species of *Juglans* (e.g., Japanese walnut) found in the state, there are many hybrids and it is very difficult to tell pure butternuts from these hybrids. We are cooperating with a molecular biologist at Notre Dame to test DNA markers to determine what species the trees are. A State and Private Forestry grant from the USDA was awarded to cover the costs for these DNA tests, and for samples to be sent by our cooperators in Ohio, Vermont, Massachusetts, and Pennsylvania.

This year, trees in our collection of 150 seedling trees at Lockwood Farm were inoculated with *Sirococcus* to assess their level of resistance and our results showed significant differences in resistance. We will continue these studies by challenging the trees with other butternut pathogens found in CT.

Japanese walnut (Heartnut) seedlings in the first row (at the left), and butternut seedlings in the second row at Lockwood Farm. The walnut leaves stand out from the petioles and the butternut leaves droop, but hybrids (third row) can have either leaf position.

Impact: The information on growth and disease resistance of butternut trees resulting from this project will provide fundamental knowledge that will give us a better understanding as to whether butternuts respond in the same way to disease throughout their natural range and enable the development of a butternut project for the curriculum of the Cherokee Central Schools Board in North Carolina.

Noteworthy Diseases

Dr. Sharon M. Douglas reported that Downy Mildews have become increasingly problematic in the horticultural industry and are currently causing serious losses in many floricultural crops. Key factors contributing to the extent of these losses are delayed recognition and misidentification. Symptoms first appear as subtle pale-yellow or light green areas on upper leaf surfaces. Infected leaves can also curl downward. On some hosts, downy mildew can result in irregular, angular lesions that can easily be confused with damage from foliar nematodes. In other cases, flower buds fail to form. Systemic symptoms can include stunting, leaf distortion and epinasty, shortened internodes, and decreases in the quantity and quality of flowers that are produced. Diagnostic symptoms gradually develop on the undersurface of the leaf as the pathogen grows out of the infected leaf. This growth appears as a fuzzy, tan-gray-purple-brown mass. Symptoms often go unnoticed until leaves brown, shrivel, and drop.

Downy mildews are fungus-like organisms or “water molds” that are more closely related to *Phytophthora* and *Pythium* than to the powdery mildews. The downy mildew genera of primary importance to greenhouse crops are *Plasmopara* and *Peronospora*. The host ranges of downy mildew pathogens vary with species. However, the taxonomy and host specificity of these mildews is under revision as new information is acquired from molecular studies. Downy mildews are obligate pathogens that obtain nutrients from plant hosts. Downy mildews grow locally and systemically in plants and can escape detection until conditions are right for sporulation. They reproduce by forming sporangiophores and sporangia (sometimes called conidiophores and conidia) that develop and grow out of the undersurfaces of infected leaves. These can resemble bunches of grapes emerging from stomates. Each “grape” is a sporangium that, depending on species and other factors, germinates directly to form a germ tube or forms many zoospores. In either case, free water on the plant surface is essential for infection. This is

a key difference in the environmental requirements that distinguish powdery from downy mildew. If zoospores are formed, they "swim" in the water, locate a host, and infect. As little as 6 hours of leaf wetness is necessary for infection. Both sporangia and zoospores can be spread by overhead irrigation or handling and by fans and air circulation.

SYMPTOMS OF DOWNY MILDEW ON ADAXIAL SURFACES OF SALVIA LEAVES.

Symptoms of downy mildew of rudbeckia--note atypical sporulation of the pathogen on the abaxial surfaces of leaves.

In greenhouses, downy mildews can survive the "off-season" as mycelium in "over-seasoning" weeds and host plants. They can also form thick-walled oospores, which are resting (survival) structures embedded in dead leaves and other host tissues. The role of these resistant structures is probably insignificant in greenhouse situations since continuous cropping usually provides a constant source of living hosts. For some types of downy mildew (e.g., downy mildew of cucurbits, blue mold of tobacco), infections are established by sporangia that are carried by moist air currents that blow north from southern regions during the growing season. Other downy mildews can be seedborne.

Development of downy mildew in the greenhouse is influenced by many environmental factors including temperature, RH, light level, and air circulation. Optimal temperatures range from 45-70 °F, but these can vary with species. Humidity levels of 85% or higher are needed for sporulation and disease development. For many downy mildew species, sporangia are produced

in the evening and released into the air the next morning. Sporangia are spread within the greenhouse via moist air currents, contaminated tools, equipment, fingers, and clothing. Sporangia are short-lived and become less infective under greenhouse conditions of high temperature and low humidity. Sporangia are also killed by intense sunlight. The infection to sporulation cycle can be as short as four days, but is usually longer, around 7-10 days.

Disease Survey

Dr. Balogh 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 winter was harsher than usual, which resulted in winter injuries in a number of evergreen plants. Spring and early summer were cool and rainy. 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.

<u>Herbaceous and Woody Ornamentals:</u>

A wide range of diseases was identified on perennials this season. Some herbaceous hosts and diseases were begonia, lavender, and zinnia with bacterial (Xanthomonas) leaf spots, chrysanthemum with white rust, iris with Didymellina leaf spot, and peony with Botryosphaeria canker.

Examples of the most common broadleaf woody ornamentals and their diseases were Exobasidium leaf gall, Phytophthora root rot and winter dieback on azalea and rhododendron, anthracnose on beech, winter injury and Volutella blight on boxwood, brown rot on ornamental cherry and plum, scab and fire blight on crabapple, and Gymnosporangium rusts on apple relatives (e.g., serviceberry, crabapple, and hawthorn). Powdery mildew and anthracnose were diagnosed on dogwood, black spot and Dutch elm disease on elm, crown gall on euonymus, eastern filbert blight on contorted filbert, winter injury on holly, and Ascochyta blight, Pseudomonas blight and powdery mildew on lilac, and Verticillium wilt and anthracnose were identified on maple. An unusual and widespread outbreak of Septoria leaf spot caused by the fungus *Septoria aceris,* was identified on sugar maples throughout the state in late summer. Winter injury and Cercospora leaf spot were observed on mountain laurel, anthracnose, leaf curl and Tubakia leaf spot on oak, Volutella blight on pachysandra, Fabraea leaf spot on Bradford pear, crown gall and black spot on rose, Pseudomonas blight on viburnum, and willow blight (a complex of black canker and scab) was identified on willow.

Most conifer species suffered from winter-related tip diebacks. Additionally, we diagnosed Kabatina tip dieback on false cypress and Cryptomeria, Phomopsis tip blight on juniper, Canavirgella and Ploioderma needlecasts, Dothistroma needle blight, and Diplodia blight on pine, and Rhizosphaera needlecast, Sirococcus blight, and Chrysomyxa rust on spruce.

Leaf gall on rhododendron caused by *Exobasidium vaccinii.*

Powdery mildew on lilac, caused by *Erysiphe* spp.

Sirococcus tip blight on spruce.

Didymellina leaf spot on iris.

Vegetables:

Noteworthy outbreaks of Septoria leaf spot and blossom-end rot were observed during the 2008 growing season. Septoria leaf spot was diagnosed unusually early on tomatoes in the 2009 growing season. Late blight of tomato was also detected in Connecticut in late June 2009. This outbreak was unusually early and widespread throughout the state and the Northeast. Bacterial diseases were prevalent throughout the state in commercial and backyard gardens including bacterial spot on pepper, bacterial spot, bacterial speck, pith necrosis, and bacterial canker on tomato. A powdery mildew outbreak devastated cucurbits in late summer of 2008.

Tree and Small Fruit:

Due to the conducive weather conditions, diseases were prevalent both in commercial and home garden settings. Among pome fruits, apples were most affected by apple scab and fire blight, whereas pears had Fabraea leaf and fruit spot. Brown rot-related shoot tip diebacks were prevalent in spring 2009 on stone fruits, and cherries and plums were especially hard-hit.

Additionally, Taphrina leaf curl, Xanthomonas bacterial spot, and X-disease were significant on peaches, nectarines, apricots, and plums. On small fruit, Phomopsis twig blight was prevalent on blueberry, and black rot, downy mildew, and powdery mildew were identified on table and winegrapes.

Turf:

The wet spring and summer of 2008 resulted in many weed and disease problems on residential lawns and golf courses. The most common disease problems diagnosed by Dr. Balogh and Ms. Inman were summer patch and Rhizoctonia brown patch. In early spring 2009, snow mold was a problem and starting from mid-spring and continuing into the summer, red thread and yellow patch remained active because of the cool, wet conditions.

Weeds:

Predominant weeds in turf and gardens were bentgrass, bindweed, nightshade, crabgrass, dodder, ground ivy, horseweed, mugwort, nutsedge, pokeweed, smartweed, and spurge. 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.

Impact: Information on the diseases that occur on plants in Connecticut landscapes, natural woodlots, and forests each year helps 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, displays at meetings and other outreach events, 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 2009, 334 vegetable and 11 lawn seeds were submitted to **Dr. Douglas** for testing. **Ms. Inman** tests all seeds 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). Testing of seeds for 2009 is ongoing. A Station publication will be written to report the findings of this year's results.

Impact: Results of seed tests conducted by Station staff are reported to the Seed Control Official of the CT Department of Agriculture who has the authority to stop the sale of products that do not meet label claims or contain noxious weeds. In the short term, this program protects state residents from purchasing inferior seed and ensures that seeds comply with the Connecticut Seed Law Regulations and the Federal Seed Act. The long-term benefit of the seed testing program minimizes the inadvertent introduction of noxious weed seeds that could potentially impact crops of economic importance and the state's ecosystem.

Samples for Analytical Chemistry and the Connecticut Department of Consumer Protection

During the year, **Dr. Balogh** and **Ms. Inman** examined 31 samples from the Connecticut Department of Consumer Protection at the request of the Department of Analytical Chemistry of the Experiment Station.

Samples for 2009 National Nursery Survey and Trace-Forward and Trace-Back Surveys for **Phytophthora ramorum**

Connecticut participates in a national survey of nurseries to assess the presence of the Ramorum Blight (Sudden Oak Death) pathogen, *Phytophthora ramorum*, in our state. Connecticut also conducts trace-forward and trace-back surveys when requested by USDA-APHIS-PPQ. The objective is to survey nurseries at risk of harboring or distributing *P. ramorum*-infected plants or when appropriate, homeowners who have received possibly infected plants. **Drs. Douglas**, **Marra**, and **Balogh** supervise the USDA-mandated assays for testing. During the past year, **Dr. Victoria Smith** (Deputy State Entomologist) supervised the collection of 335 samples by CAES nursery inspectors and PPQ personnel. Samples were then tested for *P. ramorum*. At the time of this publication, no samples tested positive in any of the 2009 surveys.

Samples for Chrysanthemum White Rust

In Fall 2008, there was another outbreak of Chrysanthemum white rust (CWR) in Connecticut. Since this is a disease of regulatory concern, the outbreak resulted in a cooperative effort between the Experiment Station and USDA-APHIS-PPQ. **Dr. Douglas** examined samples collected by CAES nursery inspectors and USDA-APHIS-PPQ personnel under the supervision of **Dr. Smith**. Over 562,373 chrysanthemums raised by 34 growers and dealers were inspected for the presence of CWR throughout the state. Infected plants were destroyed by burial onsite or by incineration. The latter process involved the largest regulatory event on record for the Experiment Station, which involved the destruction by incineration of over 61 tons of plant material and potting mix.

Citizen Inquiries

Plant Disease Information Office

Dr. Balogh, assisted by **Ms. Inman**, answered 4895 inquiries about plant health from Connecticut citizens. Although the majority of inquiries were on ornamentals, trees, and shrubs

(63%), other categories, such as food crops (18%) and turfgrasses (4%), were also well represented. A high percentage of inquiries fell into the miscellaneous category (15%), which included plant identification and poison ivy control and identification. Although the majority of inquiries were from Connecticut homeowners (65%), the number of the inquiries from commercial growers and plant care professionals (28%) showed a marked increase. Inquiries from cooperative extension, health, news, and agricultural personnel (7%) remained consistent with previous years. A further breakdown of inquiries showed that 44% of the samples came in by phone, 13% came in by mail, 3% came as email (Connecticut only), and 40% were brought in person. The number of physical samples handled by the PDIO (53%) continued to exceed the number of phone calls (44%)—this was a trend that was observed for the first time last year. Over 660 letters and numerous email messages with attached files of fact sheets were sent from the PDIO. 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.

Additional inquiries

Dr. Anagnostakis answered 353 questions, tested 45 samples, and made 19 site visits**. Dr. Elmer** made 11 site visits, answered 18 questions, and tested 22 samples. **Dr. Ferrandino** made 15 site visits, tested 20 samples, and answered 7 questions, and **Dr. Marra** made 5 site visits, answered 4 questions, and tested 8 samples from stakeholders.

Impact: During 2009, at least 5656 Connecticut residents had plant disease problems accurately diagnosed by members of the Department of Plant Pathology and Ecology. In many cases, the plant health problems diagnosed did not require fungicides for control, contrary to the initial perception that fungicides would be required. Staff worked closely to educate professionals and homeowners to develop disease management programs that were compatible with the environment that incorporated cultural practices, sanitation, and genetic resistance prior to pesticide use. Accurate diagnosis of plant health problems, educated citizenry, and implementation of integrated disease management strategies reduce pesticides introduced into the environment and water of Connecticut.

MEETINGS SPONSORED BY THE DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

Bedding Plant Meetings

Drs. Wade H. Elmer and **Botond Balogh** co-sponsored three bedding plant meetings with Ms. Leanne Pundt and Dr. Richard McAvoy of the University of Connecticut. Topics covered included: Role of Nutrition on Diseases, Diseases of Bedding Plants, Bedding Plant Production, and Insect Management. On February 10, the meeting was held at the Tolland Cooperative Extension Center in Vernon, CT; on February 20, the meeting was held in Jones Auditorium; and on February 24, the meeting was held at the University of Connecticut, Torrington campus, in

Torrington, CT. A total of 69 growers attended. Of those, 100% rated the program as useful to very useful, and over 75% said they would benefit economically as a result of this program.

Lockwood Lectures

Dr. Botond Balogh organized a Lockwood Lecture by Dr. Jeffrey B. Jones from the University of Florida who presented a lecture entitled "Current research on citrus canker, bacterial spot of tomato and pepper, and bacterial wilt."

Dr. Wade H. Elmer organized a Lockwood Lecture by Dr. LiJun Ma from the Broad Institute of MIT and Harvard in Boston, MA, who presented a lecture entitled "Lineage-specific chromosomes related to pathogenicity revealed by Fusarium comparative genomics."

Lunch Club Seminar Series

Dr. Wade H. Elmer organized and chaired the 2008-2009 Lunch Club Seminar Series. There were 12 presentations: 9 were given by Station scientists and 3 were given by outside speakers from the University of Connecticut and Wesleyan University.

Conference Organizing

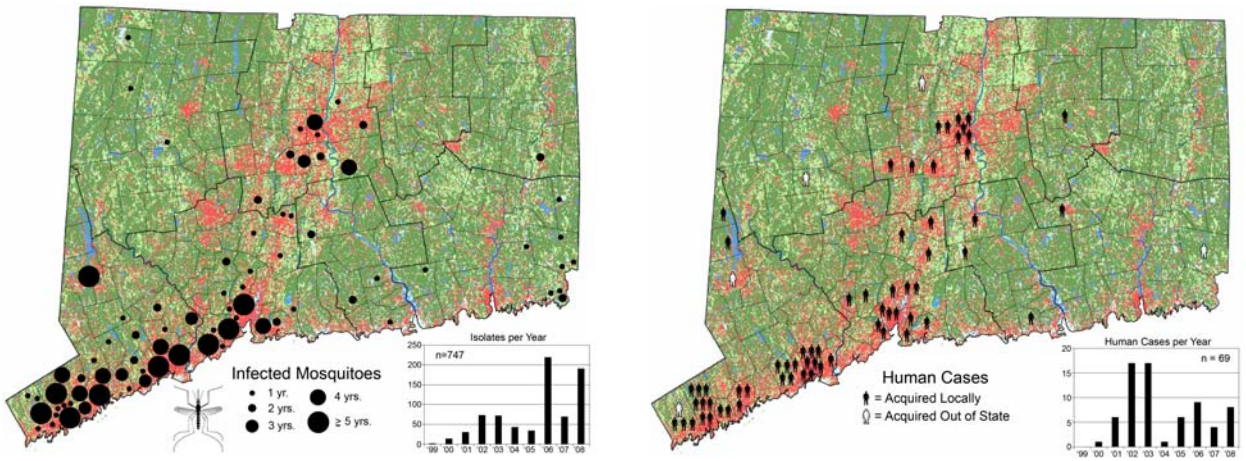
Dr. Marra served on a Steering Committee for *Connecticut Conference on Natural Resources* during 2006, 2007, 2008, and 2009. The Conference was held this year on Monday, 9 March 2009, at the University of Connecticut, Storrs. The conference was attended by five scientists from CAES who presented two talks and two posters.

Dr. Elmer and **Dr. Lawrence E. Datnoff (**Louisiana State University) organized and raised over $6,000 to sponsor the session "Role of Mineral Nutrition in IPM for Suppressing Plant Diseases" at the Sixth International Integrated Pest Management (IPM) Symposium, March 24–26, in Portland, OR.

DEPARTMENT OF SOIL AND WATER

Mosquito Trapping and Testing Program

Mosquito surveillance for West Nile (WN) virus and Eastern Equine Encephalitis (EEE) 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 WN virus 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 **Dr. Theodore Andreadis** and **Dr. 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.



The highest levels of WN virus activity in mosquitoes have occurred in densely populated urban and suburban communities in lower Fairfield and New Haven Counties and in the greater Hartford area. These regions of the state have been identified by CAES scientists as high risk areas for human infection.

In 2008, mosquito trapping was conducted from June 2 to October 16. 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). 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^{o}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 WN virus 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. 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 Connecticut Department of PublicHealth for dissemination to other state agencies, local health departments, the media, and neighboring states.

During 2008, a total of 211,657 mosquitoes (15,108 pools) representing 37 species were trapped and tested. A total of 191 isolations of WN virus were made from 9 mosquito species (*Culex pipiens* = 124, *Culex restuans* = 48, *Culex salinarius* = 10, *Culiseta melanura* = 4, *Aedes cinereus* = 1, *Culex territans* = 1, *Ochlerotatus japonicus* = 1, *Ochlerotatus stimulans* = 1, and *Ochlerotatus trivittatus* = 1) collected at 33 sites in 25 towns in 5 counties: Fairfield (Bridgeport, Darien, Fairfield, Greenwich, Monroe, New Canaan, Norwalk, Shelton, Stamford, Stratford, Westport, Wilton), Hartford (Glastonbury, Hartford, New Britain, South Windsor, Wethersfield), Middlesex (Middlefield), New Haven (Branford, Hamden, Milford, East Haven, New Haven, West Haven), New London (Stonington). The first positive mosquitoes were collected on June 11, and the last on October 7. Eight human cases, seven of which were locally acquired, were reported by the Connecticut Department of Public Health: residents of Bridgeport, Fairfield, Sherman, and Stamford.

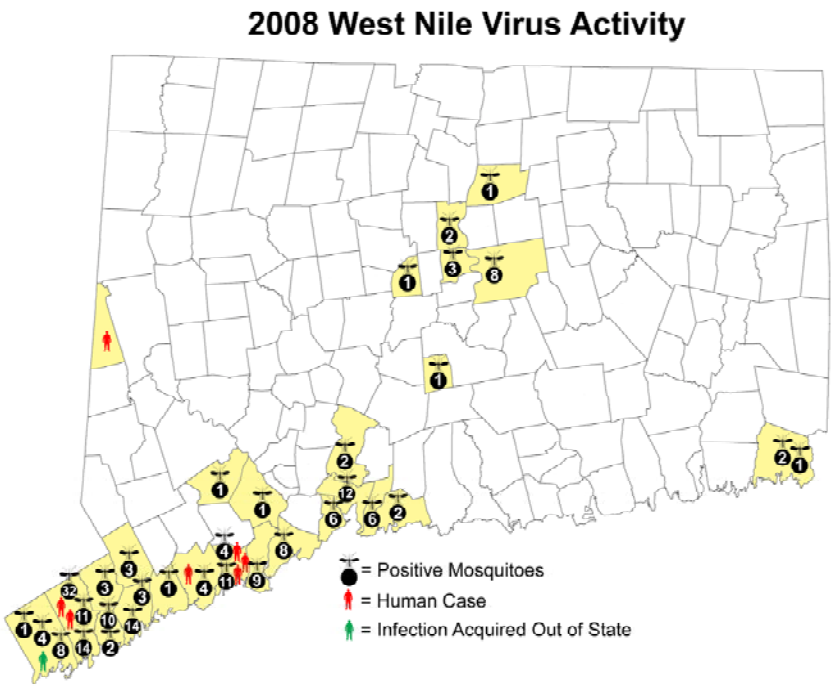
No isolations of EEE virus were made in 2008. Other mosquito-borne viruses isolated included: CV virus (13 isolations), HJ virus (13 isolations) JC virus (20 isolations), POT virus (163 isolations), and TVT virus (13 isolations).

MOSQUITO SPECIES TRAPPED AND TESTED FOR ARBOVIRUSES IN CT, 2008

Mosquito Species	# Mosquitoes	# Pools	Virus						
			CV	EEE	HJ	JC	POT	TVT	WN
Aedes cinereus	15,453	1,030	1		1		16	1	1
Ae. vexans	25,077	1,364				1	26		
Anopheles barberi	9	9							
An. crucians	25	14							
An. punctipennis	2,719	664	4		1	2	21	4	
An. quadrimaculatus	439	219				1			
An. walkeri	689	135					1		
Coquillettidia perturbans	20,185	942	2			2	5	2	
Culex pipiens	19,196	1,456							124
Cx. restuans	18,719	1,809					1		48
Cx. salinarius	14,450	878	1		1				10
Cx. territans	92	74							1

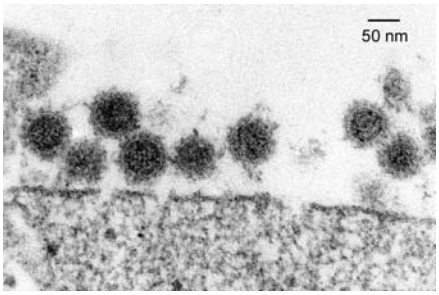
Culiseta melanura	6,409	620			7			1	4
Cs. minnesotae	9	3							
Cs. morsitans	168	72							
Ochlerotatus abserratus	2,993	158				2			
Oc. aurifer	3,124	154				3			
Oc. canadensis	19,829	957				2	18		
Oc. cantator	4,071	334			2	3	2		
Oc. communis	34	3							
Oc. excrucians	421	59				1			
Oc. grossbecki	8	5							
Oc. japonicus	1,829	668							1
Oc. provocans	69	7							
Oc. sollicitans	2,177	110							
Oc. sticticus	4,972	221				1	11		
Oc. stimulans	2,008	247				1	1		1
Oc. taeniorhynchus	6,143	239					11		
Oc. thibaulti	7,482	312				1			
Oc. triseriatus	1,328	405					5		
Oc. trivittatus	17,315	946	4				41	4	1
Orthopodomyia signifera	1	1							
Psorophora columbiae	1	1							
Psorophora ferox	11,785	560	1				4	1	
Psorophora howardii	1	1							
Toxorhynchites rutilis	1	1							
Uranotaenia sapphirina	2,424	428			1				
TOTAL	**211,657**	**15,108**	**13**		**13**	**20**	**163**	**13**	**191**

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 2008, 211,657 mosquitoes were tested for virus. There were 191 isolations of WN virus. There were 8 human cases in the state linked to WN virus 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 did take the suggested precautions. The long-term benefits include a healthy human population and a well-informed public concerning the potential risks of mosquito bites. Participation in the statewide surveillance program provided timely information about levels of virus activity in the mosquito population which was used to assess risk of human infection, inform the public and health care providers of these risks, guide vector control efforts, and prevent disease outbreaks.

Mosquito Arbovirus Studies



Drs. Philip Armstrong, Theodore Andreadis, and **John Anderson** are currently evaluating the infection patterns and genetic diversity of Cache Valley (CV) virus among mosquitoes collected in Connecticut. Data obtained during the statewide surveillance program were analyzed to identify potential mosquito vectors and discern major features of CV virus transmission. In addition, viral isolates were sequenced and compared to track the spatial and temporal spread of

genetic variants throughout the state. A total of 116 CVV isolates were recovered from 16 different mosquito species collected over an 11-year period from late August to early October throughout the state. The virus was most frequently detected in *Anopheles punctipennis* (36 isolations) followed by *Ochlerotatus trivittatus* (14), *Oc. canadensis* (13), and *Aedes cinereus* (12). Only two isolates came from *Anopheles quadrimaculatus* that was previously implicated as a major vector of CVV in New York and Indiana. The number of virus isolations fluctuated annually with major increases in 1998 (22 isolations), 2003 (72), and 2008 (13) and relatively few (≤ 4) or no isolations during intervening years. Phylogenetic analysis of CV virus isolates revealed that viral genetic variation was limited and lacked obvious geographic structure in Connecticut; nevertheless, viruses could be delineated into three well-supported clades that appeared over multiple years of sampling. One of these clades included a virus that was previously isolated from a fatal human case in North Carolina. Together, these results implicate *Anopheles punctipennis* as a major vector of CV virus in this region of the US where the virus is transmitted intermittently from late summer-early fall. This periodicity corresponds to the transmission of three dominant genetic clades of CV virus that are broadly distributed throughout Connecticut. *Impact.* Current studies on the genetic relationships of mosquito-borne viruses 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. Additional studies on the role of different mosquito species to serve as vectors of viral pathogens may be used to target anti-vector interventions more effectively.

Invasive Exotic Mosquito Studies

Ochlerotatus japonicus japonicus is an invasive mosquito native to Japan, Korea and eastern China. The species was first detected in the northeastern United States in 1998 and has rapidly spread throughout much of eastern North America. In addition to used tire casings, *Oc. j. japonicus* develops in a wide variety of man-made and natural container habitats, especially rock pools along stream beds. In an effort to evaluate the invasion success and impact of *Oc. j. japonicus* on native container dwelling species, **Dr. Theodore Andreadis** and Roger Wolfe (CT DEP) assisted by **Michael Thomas** and **John Shepard**, sampled thirteen waste tire disposal sites and four natural rock pool habitats or mosquito larvae throughout Connecticut in 2005, and data were compared with results from prior surveys of similar sites made in 1987 and 1999. *Oc. j. japonicus* was the predominant species collected at the waste tire disposal sites regardless of surrounding landscape features, accounting for 55.9% of all larvae. A comparison with collections from prior surveys revealed a 90% reduction in larval populations of *Ochlerotatus triseriatus* (4.7% from 44.5%) and significant reductions among larval populations of *Ochlerotatus atropalpus* (2.6% from 19.3%) and *Culex restuans* (19.0% from 32.5%). *Oc. j. japonicus* was also the most abundant mosquito collected in rock pool habitats, accounting for nearly 80% of all collected larvae, except where water temperatures exceeded 30^{o}C. This was concomitant with significant declines in the abundance of *Oc. atropalpus* (14.6% from 17.7%) and *Cx. restuans* (7.9% from 24.7%). They concluded that *Oc. j. japonicus* is a superior competitor in rock pool and tire environments and is most likely responsible for

reducing populations of native species occupying these habitats through interspecific competition for limited resources. The exclusion of *Oc. j. japonicus* from warm water pools further suggests that a temperature barrier may exist for *Oc. j. japonicus* and that populations may not be able to effectively colonize regions of the United States with relatively high summer temperatures.

Knowledge of the host-feeding behavior and extent of interactions with human hosts are important in evaluating the role and vector potential of invasive mosquitoes in transmission of native arboviruses. **Drs. Goudarz Molaei** and **Theodore Andreadis** in collaboration with scientists from Rutgers University collected blood-engorged females of *Oc. j. japonicus* from sites in New Jersey during 2000 to 2007, and identified the sources of vertebrate blood meals by sequencing portions of the cytochrome *b* gene of mitochondrial DNA. Over one-third (36%, *n* = 36) of the engorged mosquitoes acquired blood meals from humans. Other mammalian hosts included white-tailed deer (53%), fallow deer (5%), horse (3%), and Virginia opossum (3%). No avian, amphibian, reptilian or mixed blood meals were identified. *Impact.* The detection of a comparatively high prevalence of human blood feeding in *Ae. j. japonicus* in association with its increasing dominance, local abundance, vector competence and repeated detection of West Nile (WN) virus from field-collected specimens, illustrates the potential for this invasive mosquito to serve as a "bridge" vector in transmission of WN virus and other mosquito-borne viruses in North America.

Mosquito Feeding Studies

Drs. Goudarz Molaei, Theodore Andreadis, Philip Armstrong and Maria Duik-Wasser (Yale University) evaluated the blood-feeding patterns of a number of mosquito species that serve as vectors of disease agents in the northeastern US. Blood-fed mosquitoes were collected from 91 different sites throughout Connecticut over a six-year period (June through October, 2002 to 2007), and the host feeding patterns of 23 mosquito species representing 7 genera were examined by using a PCR-based assay and sequencing portions of the *cytochrome b* gene of mitochondrial DNA. With the exception of *Culex territans* that acquired blood meals from all 4 classes of vertebrates: birds, reptiles, amphibians, and mammals, all species of *Aedes, Anopheles, Coquillettidia, Ochlerotatus, Psorophora,* and to a lesser degree, *Uranotaenia* were found to feed predominately upon mammalian hosts. Fourteen different mammalian species were identified as sources of blood, but the vast majority of feedings were taken from the white-tailed deer, *Odocoileus virginianus*. Human-derived blood meals were identified from 13 of the 23 mosquito species. Limited avian-derived blood meals were detected in *Ae. cinereus*, *Cq. perturbans*, *Cx. territans*, *Oc. canadensis*, *Oc. cantator*, *Oc. triseriatus*, *Oc. trivittatus*, *Ps. ferox*, and *Ur. sapphirina*. American robin, *Turdus migratorius*, was the most common source of avian blood, followed by a few other mostly Passeriformes birds. They concluded that white-tailed deer serve as the main vertebrate host for these mammalophilic mosquitoes in this region of the US.

Impact. These feeding patterns supports enzootic amplification of arboviruses including Jamestown Canyon, Cache Valley, and Potosi viruses that perpetuate in cervid hosts. Occasional feeding on avian hosts suggests that some of these mosquito species, such as *Cq. perturbans*, could also facilitate transmission of West Nile and eastern equine encephalitis viruses from viremic birds to mammalian hosts.

Drs. Goudarz Molaei, Theodore Andreadis, Philip Armstrong in collaboration with scientists at NY State Department of Health and Rutgers University examined the host-feeding patterns of *Anopheles quadrimaculatus* and *Anopheles punctipennis* in order to evaluate their potential contributions to transmission of eastern equine encephalitis (EEE) virus and other arboviruses in northeastern USA. Engorged mosquitoes of the two species were collected from EEE virus foci in central New York (NY), and throughout New Jersey (NJ), and their blood meals were identified using a PCR-based assay and sequencing portions of the mitochondrial cytochrome *b* gene. Analysis of 131 *An. quadrimaculatus* and 107 *An. punctipennis* from NY revealed that 97.7% and 97.2%, respectively, acquired blood solely from mammalian hosts. Similarly, examination of 288 *An. quadrimaculatus* and 127 *An. punctipennis* from NJ showed 100% and 96.0%, respectively, mammalian-derived blood meals. Mosquitoes containing mixed-blood meals from both avian and mammalian hosts were detected in 1.6% of *An. quadrimaculatus* in NY, whereas, *An. punctipennis* acquired 2.8% and 4.0% mixed blood meals in NY and NJ, respectively. White-tailed deer (*Odocoileus virginianus*) constituted the most common vertebrate host for these anopheline mosquitoes, comprising 85.8% to 97.7% of all blood meals identified. Predominance of white-tailed deer as a source of blood meals supports enzootic amplification of deer-associated arboviruses in this region, including Jamestown Canyon, Cache Valley, and Potosi viruses. One horse- and two human-derived blood meals were also detected from *An. quadrimaculatus* collected in NJ. Limited avian-derived blood meals were detected from mourning dove (*Zenaida macroura*), sharp-shinned hawk (*Accipiter striatus*), and house finch (*Carpodacus mexicanus*), mostly in mixed blood meals. Occasional feeding on avian hosts suggests that these mosquitoes, may participate as epidemic/epizootic bridge vectors of EEE virus from viremic birds to mammalian hosts of concern including horses and humans. An isolate of EEE virus was recovered from the head and thorax of an *An. punctipennis* mosquito collected in NY.

Mosquito Genetic Studies

Mosquitoes of the *Culex pipiens* complex are important vectors of West Nile virus in the US. **Drs. Shaoming Huang, Goudarz Molaei, Theodore Andreadis** in collaboration with scientists from Michigan State University, University of Wisconsin, and Emory University, examined the genetic variations of *Cx. pipiens* mosquitoes from Chicago, Illinois that were determined to be principally ornithophilic but exhibited a relatively higher inclination for mammalian hosts including humans. Microsatellite analysis of 10 polymorphic markers was performed on 346 engorged *Cx. pipiens* specimens with

identified avian or mammalian blood meals. Results indicated that there were no significant differences in allelic richness, the pattern of conformity to Hardy-Weinberg equilibrium and linkage disequilibrium, nor was there overall genetic differentiation between specimens with avian- and mammalian-derived blood meals. However, *Cx. pipiens* form pipiens with mammalian- (including human-) derived blood meals had significantly higher ancestry ($P < 0.001$) and proportion of hybrids ($P < 0.01$) from the *Cx. pipiens* form molestus (population from New York City) than did those with avian-derived blood meals. By contrast, there were no significant differences in the ancestry ($P > 0.05$) and the proportion of hybrids ($P > 0.05$) from *Cx. quinquefasciatus* (population from Harris Country, Texas). No temporal genetic variation was detected in accordance with the observation that there was no shift in blood feeding from birds to mammals. The results of this study in conjunction with regional host-feeding behavior, suggest that the probability of genetic ancestry from *Cx. pipiens* f. molestus may predispose mosquitoes to feed more readily on mammals, however the genetic mechanisms are unknown.

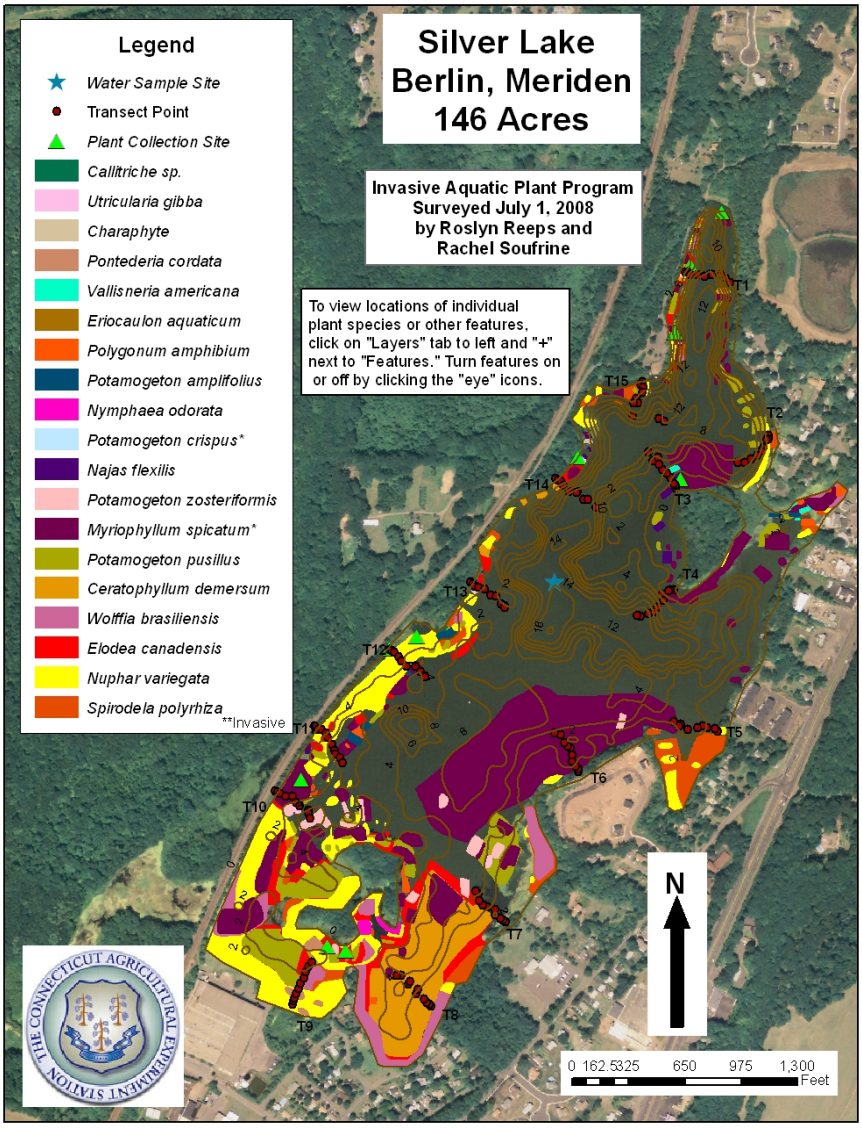
Mosquito Biological Control Studies

Microsporidia are among the most common parasites that infect populations of mosquitoes in nature. They pose no threat to human health or beneficial insects but have very complex life cycles that include obligatory development in a microcrustacean host, a copepod. Factors that directly impact horizontal transmission of the of the microsporidian species *Amblyospora albifasciati* to its intermediate copepod host, *Mesocyclops annulatus* were examined in laboratory bioassays by **Dr. Theodore Andreadis** in cooperation with scientists from Centro de Estudios Parasitológicos y de Vectores, in La Plata, Buenos Aires, Argentina. Results were evaluated in relation to life history strategies that facilitate persistence of the parasite in natural populations of its definitive mosquito host, *Ochlerotatus albifasciatus*. A moderately high quantity of meiospores from mosquito larvae was required to infect adult female copepods; the IC50 was estimated at 3.6×10^4 meiospores/ml. Meiospore infectivity following storage at 25 ºC was detected up to 30 days, while meiospores stored at 4 ºC remained infectious to copepods for 17 months with virtually no decline in infectivity. Uninfected female *M. annulatus* were long-lived; no appreciable mortality was observed in field-collected individuals for 26 days, with a few individuals surviving up to 70 days. The pathological impact of *A. albifasciati* infection on *M. annulatus* resulted in a 30% reduction in survivorship after 7 days followed by gradual progressive mortality with no infected individuals surviving more than 40 days. This moderate level of pathogenicity allows for a steady continual release of spores into the environment where they may be ingested by mosquito larvae. Infected female copepods survived in sediment under conditions of desiccation up to 30 days, thus demonstrating their capacity to function as a link for maintaining *A. albifasciati* between mosquito generations following periods of desiccation. The susceptibility of late stage copepodid *M. annulatus* to meiospores of *A. albifasciati* and subsequent transstadial transmission of infection to adult females was established.

Controlling Invasive Aquatic Weeds in Connecticut Lakes

Surveillance and Monitoring Program. During the 2008 field season, 6 additional lakes were mapped for aquatic vegetation by two-person research teams under the direction of **Gregory Bugbee**. Lake Candlewood, Connecticut's largest lake was resurveyed to determine the effects of winter drawdown on the invasive species: Eurasian water milfoil *(Myriophyllum spicatum)*, minor naiad *(Najas minor)* and curly leaf pondweed *(Potamogeton crispus)*. When added to the previous 131 lakes, a total of 137 water bodies have now been comprehensively surveyed as part of the program. Lake Candlewood has been surveyed three times and Lake Zoar has been surveyed twice; both water bodies are being monitored to track the long-term population dynamics of resident invasive species. Global positions system (GPS)-based bathymetric vegetation maps have been created and digitized, along with text-based narratives. In addition, GPS-derived transects have been established within each lake or pond. These transects will serve as a diagnostic assessment tool to track changes in aquatic species abundance and distribution over time. Water samples have also been collected from all lakes/ponds and are being analyzed for a range of parameters, including pH, temperature, clarity, alkalinity, nitrogen, and phosphorus. These data, along with watershed information, are being used to investigate possible abiotic factors contributing to magnitude of invasion in individual water bodies. All information is being incorporated into the publicly accessible Connecticut Agricultural Experiment Station Invasive Aquatic Plant website (http://www.ct.gov/caes/IAPP).

More than 60 percent of the surveyed water bodies contain one or more invasive plant species. Some lakes contained as many as four invasive species. The most commonly found invasive plants were Eurasian water milfoil (*M. spicatum*), variable water milfoil (*Myriophyllum heterophyllum*), minor naiad (*Najas minor*), curly leaf pondweed and fanwort (*Cabomba caroliniana*). Less commonly found were mud mat (*Glossistigma cleistanthum*), water hyacinth (*Eichornia crassipes*), water shamrock (*Marsilea quadroflia*) and hydrilla (*Hydrilla verticillata*). **S**urveys of Williamson pond in Columbia discovered the first infestation of Yellow floating heart (*Nymphoides peltata*). In cooperation with the Connecticut Department of Environmental Protection, the pond was treated with an herbicide and the invasive plant was controlled. This cooperative early detection and rapid response effort will serve as a model for future plant invasions. Samples of species from all surveyed lakes are being archived in the CAES herbaria collection.



Gregory Bugbee continues investigating the use aerial images as a surveillance tool. Aerial photographs were obtained for three of the State's largest lakes (Candlewood, Lillinonah and Zoar) from the USDA National Agriculture Imagery Program (NAIP). Although actual shoreline conditions are easily visible, accurate analysis and monitoring of submersed aquatic vegetation will require the use of specialized computer software. The utility of this approach is currently being evaluated. *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.

Chemical Control of Exotic Weeds. A central goal of the Invasive Aquatic Weed Program has been to investigate novel methods of chemical control so as to restore native plant communities to aquatic ecosystems as they existed prior to invasion by non-native species. **Gregory Bugbee** and **Dr. Jason White** have several long-term research projects.

1. *Bashan Lake, East Haddam, CT.* A tenth year of research involving the use of spot applications of the herbicide 2,4-D to control variable milfoil was completed. For a fourth consecutive year, we have shown the effectiveness of early autumn herbicide applications. Reduced lake usage by residents makes late season treatments desirable and concerns over efficacy on plants beginning natural senescence appear unwarranted. We have also reduced the dosage to half of that originally recommended. We have also integrated underwater video equipment with a GPS and geographic information system (GIS) software to precisely locate and treat patches of variable milfoil. *Impact statement.* Effective development of late season herbicide application approaches are highly desirable because of the low lake usage by stakeholders during the early fall.

2. *Grannis Lake, East Haven, CT.* This was the sixth year of study at Grannis Lake, which has a unique combination of problematic vegetation, including Eurasian milfoil, sago pondweed (*Stuckenia pectinatus*), curly leaf pondweed, and coontail (*Ceratophyllum demursum*). As part of a novel approach in 2005, an early season application of the contact herbicide diquat was implemented to reduce weed growth in the water and then a long-term (several months) low dose fluridone treatment to eliminate the roots and turions. In 2007, re-growth of sago pondweed, coontail and curly leaf pondweed was noticeable. In early September 2007 and in close collaboration with the CT Department of Environmental Protection Fisheries Division, a population of the generalist feeding triploid grass carp was introduced into the lake as part of an integrated management approach. Ten fish per acre were introduced. Over 200 georeferenced grid points inside the lake are being monitored for the effects of the grass carp on both native and invasive plant species. As expected, no decrease in vegetation was observed in the year after the grass carp introduction because the fish had not yet reached sufficient size to consume sufficient quantities of plant material. *Impact*. Successful development of an integrated chemical/biological approach may be highly useful in lakes with multiple invasive species present.

3. *Crystal Lake- Middletown, CT.* This body of water has extensive growth of curly leaf pondweed and Eurasian watermilfoil. Chemical control efforts have been hampered due to the presence of a threatened plant species *Potamogeton vaseyi*. In 2007, limnobarriers were used to isolate the beds of threatened plants and then used the aquatic herbicide diquat to manage the invasive plants. The treatment occurred in late April and within several weeks the unwanted vegetation was controlled. However, by late summer re-growth of curly leaf pondweed had begun but no Eurasian milfoil was observed. This trend continued in 2008 with re-growth of the curly leaf pondweed to pretreatment levels but virtually no re-growth of the Eurasian water milfoil. This near complete elimination of Eurasian milfoil by the April diquat treatment may be a new tool for this plants control and needs further study. A late summer survey for the threatened *P. vaseyi* by CT DEP found that the plant was growing well in the areas that had been protected by the limnobarriers. Eight species of native plants were found the year after treatment compared to only four the year prior to treatment. This suggests that the application of diquat did not adversely affect plant communities and may have actually benefited native species. *Impact*. Scientific data on the effectiveness of chemically controlling invasive species while simultaneously protecting threatened plants is quite limited and therefore, information from this type of experiment is extremely valuable.

Biological Control

1. *Integrated Pest Management.* **Dr. Jason White** in collaboration with former Postdoctoral Scientist, **Dr. Michelle Marko**, now at Concordia College, MN have continued field-based microcosm investigations validating the efficacy of an integrated biological and chemical control technique to manage the invasive aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*). As indicated above, *M. spicatum* is one of the most common submerged invasive plants in CT lakes and ponds, occurring in approximately one quarter of the surveyed water bodies. Current management options for *M. spicatum* are plagued by shortcomings, such as damage to non-target species, high cost, potential herbicide resistance of the weed, and overall ineffectiveness. The native insect *Euhrychiopsis lecontei* has been shown to control *M. spicatum* under certain conditions. The goal was to assess the potential integration of reduced herbicide application rates and augmented insect populations as a control option. The objectives of the project are as follows:

<u>*Objective 1*</u>. In greenhouse based-tank studies, quantify *M. spicatum* control with the following techniques applied *separately*: the herbicides 2,4-dichlorophenoxyacetic acid (2,4-D) or fluridone at the recommended application rate, or the insect herbivore *Euhrychiopsis lecontei* (the milfoil weevil).

<u>*Objective 2*</u>. In greenhouse based-tank studies, quantify *M. spicatum* control with *E. lecontei* in conjunction with 2,4-D or fluridone at 10, 25, or 50% of the recommended application rate.Sixteen 100-gallon tanks were established in the field. Each tank was amended with plastic pots containing sediment and stems of *M. spicatum*. As in 2007, water samples for herbicide analysis were taken from the tanks during the course of the integrated trials in 2008. The 2007 data have been reported previously; the herbicides were added at the label rate and are thus reported as 100%. In 2008, 2,4-D application rates were calculated at 10% and 2% of the label rate. Clearly and as expected, the concentration of 2,4-D in the water of the integrated treatment tanks was dramatically lower than with the full treatment. Concentrations of 2,4-D reached maximum levels within the first two days and by 20 days, had reached non-detectable levels (about half the time seen with the full rate). Similar trends were evident with fluridone, which was added at 50% and 10% of the label rate; concentrations reached maximum levels within the first few days but were dramatically lower than observed at the full rate. In spite of the "bump up" in herbicide required at 28 days, concentrations still reached non-detectable levels in 2008 a full month earlier than observed in 2007. In 2007, the separate treatments provided the following levels of control: 2,4-D, fluridone, and weevils yielded 100, 86, and 73% reductions in milfoil biomass relative to un-treated controls. The untreated control plants grew at a steady rate, increasing their biomass 4-fold by the end of the trial. The milfoil in the various treatments behaved completely different. At 12 days, no growth had occurred in any of the tanks receiving integrated chemical/biological treatment. By day 28, both levels of fluridone (50 and 10%) and 2,4-D at 10% yielded significant *decreases* in biomass relative to the 3 day value. By day 56, all integrated treatments resulted in biomass reductions, both relative to the 3-day value for each

treatment and obviously, relative to the untreated control plants. These findings are particularly noteworthy given the significant reduction of herbicides used in these experiments (50-98% reduction in chemical usage). In spite of significant/dramatic reductions in the amount of herbicide added to the tanks, excellent milfoil control was achieved when the weevils were integrated with the reduced chemical application. Future experiments are currently being planned so as to evaluate the efficacy of this type of integrated approach under field conditions. *Impact.* Successful development of a biological control technology or an integrated chemical/biological strategy will increase the tool box of options for lake managers and may result in dramatically reduced levels of chemicals being introduced as part of management efforts.

2. Weevil (Euhrychiopsis lecontei) introductions in the field. **Dr. Jason White** and **Dr. Michelle Marko** have continued our field research in CT lakes investigating the interactions between Eurasian water milfoil (*M. spicatum*) and the milfoil weevil (*E. lecontei*). There is evidence that this insect has controlled Eurasian water milfoil in other states and although native to CT, the distribution was unknown. In previous years of the program, we surveyed 17 lakes, and noted *E. lecontei* populations in all instances. We are currently conducting two separate long-term investigations on the impact of augmented weevil populations on Eurasian milfoil control.

The first project is in Lake Candlewood; although the lake contains in excess of 250 acres of milfoil, our surveillance for the weevil showed extremely low population densities. In early 2008, CAES investigators located several areas for weevil introduction; prior to that augmentation, milfoil density was thoroughly quantified with our GPS/GIS-derived protocols. Subsequently, in excess of 10,000 weevils were introduced into several designated areas of the lake. Future efforts will involve monitoring both weevil and milfoil populations in treated and un-treated control areas of the lake. The second investigation is in Indian Lake; the Indian Lake Association initiated a weevil stocking program in 2008. We monitored milfoil and weevil populations prior to augmentation efforts and are currently following populations in a manner similar to that for Lake Candlewood. Unlike Lake Candlewood, Indian Lake already had a vigorous weevil population prior to augmentation. Preliminary data show that average weevil populations in the stocked/augmented areas were higher (1.25 weevils/stem) than in control patches (0.98 weevils/stem), but these values were not significantly different. Investigations will continue in the upcoming field season. *Impact*. Field demonstration of a biological control option for Eurasian milfoil control in CT lakes would be of tremendous value to lake managers, towns, and regulators.

3. *Molecular studies*. The goal of these investigations is to use the sequence database that **Dr. Charles Vossbrinck** has developed to identify plant species and hybrids from CT lakes. He is studying the population dynamics of the the aquatic milfoil weevil, *E. lecontei*. The focus and approach is now three fold. First, he now has DNA sequences for a large number of the aquatic plants in Connecticut. He has been building a DNA database by sequencing three genes from the aquatic plants of Connecticut. A total of 56 plant species have been sequenced for three genes and h 130 sequences have been submitted to the national DNA sequence data base, GenBank (http://www.ncbi.nlm.nih.gov/Genbank/index.html). The DNA database is now being used to identify plants that are difficult or nearly impossible to identify using conventional

morphological analysis. Second, collaboration with Dr. Ryan Thum of Grand Valley State University (Muskegon, Michigan) is continuing. It has been observed that there are four separate lineages of variable milfoil (*Myriophyllum heterophyllum*) in CT waters, as compared to New Hampshire where only a single lineage is present. *Myriophyllum heterophyllum* samples have additionally been sampled from up to five separate locations within eighteen CT Lakes. We have also collected water quality data (alkalinity, nutrients, pH, and conductivity) at each sampling location and will determine the relationship between these lake water characteristics and the distribution of the various milfoil lineages.

Dr. Charles Vossbrinck is also in the process of developing micro-satellite DNA markers to understand the population genetics of our biological control agent, the milfoil weevil. As noted above, the weevil has successfully controlled the invasive Eurasian watermilfoil (*M. spicatum*) under certain conditions in other states. Ten micro-satellite markers have been developed for this weevil species and these markers have been tested on 50 individual weevils from Crystal Lake in Middletown CT. Comparisons among weevil populations within a lake will be made as well as comparing populations from different lakes. Goals for the program include:

1. Do different populations of this weevil feed on the native *Myriophyllum sibiricum* versus the invasive *Myriophyllum spicatum* (Eurasian Milfoil)?
1. How do weevils re-populate a pond after an herbicide treatment against the Eurasian Milfoil?
2. How does the introduction of the *Euhrychiopsis lecontei* for biological control purposes affect the population of weevils already in the lake?
3. Can weevils move between water-bodies that are in close proximity to each other?
4. Does the distribution of different weevil populations change in a lake from year to year?

Impact. The successful implementation of a molecular-based identification system will significantly increase the accuracy of vegetation surveys in CT Lakes. Also, knowledge on the extent of hybridization among aquatic plant species and of population-level differences among biological control agents is of significant scientific and practical interest.

Outreach efforts

Given the magnitude of invasion by non-native aquatic plants, we are 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. We have assembled numerous publications that 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/IAPP). Included are all publications in downloadable PDF formats, as well as the digitized interactive maps of all surveyed lakes. CAES scientists have also 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),

North American Lake Management Society (NALMS), and the Connecticut Federation of Lakes (CFL). *Impact.* Successfully educating and engaging stakeholders is critical to the success of CAES efforts at managing invasive aquatic plants in CT waters.

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* ssp *pepo* (zucchini) cultivars seemed to have remarkable abilities to phytoextract the weathered residues but that significant crop variability may exist down to the subspecies level. Studies were conducted under this line of investigation in the past year.

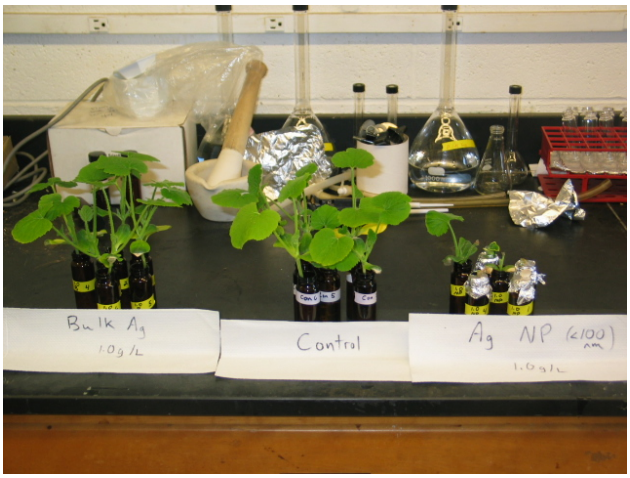
1. In field experiments at Lockwood farm, six different cultivars of *C. pepo* were grown in soil containing weathered DDE at levels of 50-300 ng/g. Three of the cultivars (Goldrush, Raven, Costata Romanesco) were from the subspecies *pepo* and have been previously shown to accumulate significant amounts of weathered DDE in the roots and stems. The other three cultivars (Zephyr, Yellow Crook, Patty Pan) were from the subspecies *ovifera* and have been previously shown to accumulate negligible amounts of weathered DDE. During the 2007 field season, the DDE uptake abilities of these cultivars were again confirmed but he also created all possible hybrid crosses between the different DDE accumulating and non-accumulating cucurbit cultivars. Manual pollination of female flowers began in the middle of the growing season. Viable F1 seeds were harvested and planted during the 2008 field season. Results demonstrated that the ability of the hybrids to accumulate DDE does change upon hybridization. Non-accumulating squash that are crossed/pollinated with DDE-accumulating zucchini acquire the ability to extract the pesticide. However, the converse is not true; DDE-accumulating zucchini that are crossed/pollinated with non-accumulating squash retain their ability to extract the pesticide (Figure 2). In addition, during the 2008 field season, all F1 hybrids were back crossed with their original parental strain. The current 2009 field season is evaluating these backcrossed hybrids. *Impact statement.* The ability to accumulate and translocate weathered DDE is a unique ability restricted to *C. pepo* ssp *pepo*. Following the inheritance patterns of the DDE accumulating abilities of F1-F3 hybrids of *C. pepo* will make it possible to determine the underlying molecular basis for this unique ability. Once this is done, efforts to maximize this ability in zucchini or transfer the gene(s) to other plants will become possible.

2. In ongoing collaborative experiments with Dr. Om Parkash of the University of Massachusetts, molecular analysis of DDE-accumulating and non-accumulating cucurbit cultivars that were grown in hydroponic solutions containing the contaminant at levels just under water solubility continued. After 4 weeks, the tissues (roots, shoots) were frozen in liquid nitrogen and shipped to UMass for a differential mRNA substraction analysis. A colony array

method for screening the differentially expressed subtracted cDNAs from *C. pepo* ssp *pepo* stem and root tissues exposed to DDE but absent in DDE-exposed *C. pepo* ssp *ovifera*. In this experiment, we used DDE-induced cDNA from *C. pepo* ssp *pepo* as "tester" while the reference cDNAs from the DDE-induced *C. pepo* ssp *ovifera* set as "driver." The subtracted cDNAs that were differentially expressed were hybridized strongly to the forward subtracted probes. Initially, we picked 24 cDNA clones, which were present in "tester" population from *C. pepo* ssp *pepo* stems and absent in "driver" cDNAs set from *C. pepo* ssp *ovifera* stem tissues. We have sequenced these differently expressed cDNA clones. A BLAST search against plant gene database showed the sequence homology with 'Phloem Protein 1 (PP1)' from *Cucurbita maxima* and many 'novel' genes with unknown function. The PP1 protein is suspected to be involved in long distance transport of solutes and metabolites. They additionally used semi quantitative RT-PCR to confirm the differential regulation of the putative PP1, cyt P450 and other 'novel' genes from *C. pepo* ssp *pepo* (zucchini) and *C. pepo* ssp *ovifera* (squash) stem and root tissues exposed to DDE. Our initial results showed that the mRNA transcript expression level for PP1 in stem tissues, and cyt P450 in root tissues is higher in DDE exposed *C. pepo* ssp *pepo* as compared to control *C. pepo* ssp *pepo* (no DDE) and DDE exposed *C. pepo* ssp *ovifera* (Figure 3). They are in the process of analyzing the expression levels of 'novel' gene sequences. *Impact.* The ability to accumulate and translocate weathered DDE is a unique ability restricted to *C. pepo* ssp *pepo*. Isolation of the molecular/genetic controls of this system will enable a full characterization of the remedial potential of this species, as well as potential transfer of the genes to plants perhaps more effective and amenable to field scale phytoremediation.

3. A survey of the literature indicates that a range of extraction methodologies have been used to quantify pesticide levels in vegetation. **Dr. Jason White** in collaborative experiments with Dr. Jason Kelsey of Muhlenberg College, a methods study was conducted in which several widely used protocols for extracting organic chemicals from plants were directly compared. Sample availability, resource use, efficiency, time consumption, space allocation, and cost vary considerably among the commonly employed techniques. The study compared US EPA Method 3546 Microwave assisted extraction, blender homogenized extraction, US EPA Method 3540 Soxhlet extraction, and the QuEChERS method with a simple oven assisted extraction (OAE) for the recovery of field-incurred DDE residues in *Cucurbita pepo* tissues. Analysis indicates that the hot solvent soak (OAE) of stem or root tissues in a 2-propanol / hexane mixture at 65 °C yields statistically equivalent DDE recoveries to other more exhaustive and resource-intensive methods. *Impact.* Many of the standard protocols for extracting organic pollutants from plants are resource- and labor-intensive. This study has shown that a simple oven based solvent soak is statistically equivalent to these other methods; the combined simplicity, precision, and accuracy of the OAE method to extract organic pollutants make it ideal for use in phytotechnology development and risk assessment. As such, this method can be used more widely by researchers/regulators at smaller institutions and in developing countries.

Uptake of Nanoparticles by Plants



The manufacture and use of nanoparticles has increased dramatically in the past decade. The potential risks posed by nanoparticles to humans and the environment have been investigated only recently. Although there have been several studies evaluating nanoparticle exposure to humans, mammals, aquatic invertebrates, and microorganisms, there is little information about their effects on terrestrial plants. The effects of five nanomaterials (multi-walled carbon nanotubes [MWCNTs], Ag, Cu, ZnO, Si) and their corresponding bulk counterparts on seed germination, root elongation, and biomass of *Cucurbita pepo* (zucchini) were investigated by **Dr. Jason White**. The plants were grown in hydroponic solutions amended with nanoparticles or bulk material suspensions at 1000 mg/L. For germination and root elongation trials, assays were run in the presence or absence of sodium dodecyl sulfate (SDS; 0.2%). Seed germination was unaffected by any of the treatments but Cu nanoparticles reduced emerging root length by 77 and 64% relative to unamended controls and seeds exposed to bulk Cu powder, respectively. During a 15-day hydroponic trial, the biomass of plants exposed to MWCNTs and Ag nanoparticles was reduced by 60 and 75%, respectively, as compared to control plants and corresponding bulk carbon and Ag powder solutions. Although bulk Cu powder reduced biomass by 69%, Cu nanoparticle exposure resulted in 90% reduction relative to control plants. Both nanoparticle and bulk ZnO significantly reduced zucchini biomass. The biomass and transpiration volume of zucchini exposed to Ag nanoparticles or bulk powder at 0, 1.0, 10, 50, 100, 500, and 1000 mg/ml for 17 d was measured. Exposure to Ag nanoparticles at 1000 and 500 mg/ml resulted in 71 and 57% decreases in plant biomass, respectively, as compared to controls or to plants exposed to bulk Ag (Figure 4). The effective concentration for 50% reduction (EC50) in either biomass or transpiration for Ag nanoparticles is at least two orders of magnitude lower than for bulk silver particles. *Impact statement.* These findings demonstrate that the toxicity of nanoparticles to agricultural plant species can be significantly greater than that observed for the corresponding non-nano or bulk material. In addition, standard phytotoxicity tests such as germination and root elongation may not be sensitive enough or appropriate when evaluating nanoparticle toxicity to agricultural plant species.

Photochemical Bleaching of Marine Dissolved Organic Matter

The fate of dissolved natural organic matter (DOM) in seawater has important implications for the planetary carbon cycle and oceanic biological productivity. Little is known quantitatively about how marine DOM is transformed and degraded. Photobleaching seems to play a major role. Photobleaching is important to understand because DOM chromophores impact oceanic primary productivity by affecting the depth of the photic zone and by absorbing harmful UV radiation. **Dr. Joseph Pignatello** in collaboration with Dr. William Mitch, Yale University studied the effect of halide ions (Cl, Br) on photobleaching. Their results indicate that direct photolysis is the dominant absorbance photobleaching mechanism and that increasing halide concentration increase absorbance photobleaching by up to ~40%. This effect was independent of carbonate concentration or ionic strength, and hence is not likely a secondary affect associated with DOM molecular conformation in solution. They confirmed the formation of hydroxyl radical (HO·) in irradiated samples and its appreciable scavenging by halides. Gamma-radiolysis experiments and associated modeling indicated that a component (~12%) of the DOM photobleaching rate enhancement by halides is consistent with the hypothesis that halide scavenging of HO· forms reactive halogen radicals that target electron-rich chromophores within DOM more selectively than does HO· itself. The mechanism responsible for the remaining component of photobleaching rate enhancement by halides remains unresolved. *Impact.* These results show that direct photobleaching may be a major pathway for abiotic processing of DOM in seawater and sea spray, and that chloride ion effects both the rate and pathway of photobleaching.

Effect of Cu(II) on the Sorption of 2,4,6-Trichlorophenol onto Multi-Walled Carbon Nanotubes

Carbon nanotubes (CNTs) are being developed for use in many technological applications and consumer products, and the ultimate release of some fraction of the produced CNTs into the environment is assumed. Some studies indicate penetration of CNTs into biomembranes and exertion of toxic effects on organisms ranging from bacteria to animals. Carbon nanotubes are strong adsorbents of hydrophobic pollutants especially aromatic compounds. In this role, they may influence the behavior of pollutants in soils and sediments and/or may serve to carry adsorbed environment pollutants into cells. Although several studies have examined adsorption of individual compounds to CNTs, little is known about how organic compounds adsorb to CNTs in the presence of natural substances such as humic substances and metal ions. Adsorption equilibrium of 2, 4, 6-trichlorophenol (TCP) on multiwalled carbon nanotubes (MWCNTs) were investigated by **Dr. Joseph Pignatello** in collaboration with Dr. Xiao-Quan Shan, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing to explore the possibility of using MWCNTs for concentration, detection and removal of TCP from contaminated water. The adsorption of TCP on MWCNTs at pH 4 was nonlinear,

reversible and best fit by a Polanyi-Manes model. Oxidation by nitric acid increased surface area and introduced hydrophilic carboxylic groups to the defect sites of MWCNTs, hence increasing the sorption of TCP and Cu(II) individually. Cu(II) suppressed the sorption of TCP on the oxidized MWCNT, while Cu(II) had little effect on the original MWCNTs. TCP had no influence on Cu(II) sorption to either. The mechanisms of Cu(II) suppression of TCP adsorption are ascribed to the formation of surface complexes of Cu(II), which were verified by X-ray absorption spectroscopy. Cu(II) exerts a cross-linking effect of functional groups on adjacent tubes, creating a more tightly-knit bundle and suppressing the condensation of TCP in the porespaces between the tubes. The large hydration sphere around surface complexes of Cu(II) may also intrude or shield hydrophilic sites by a steric effect, leading to the "crowding out" of TCP around the Cu(II)-complexed sites. *Impact.* This is a novel mechanism that will help researchers interpret and predict sorption and desorption of aromatic pollutants in the environment and in biological fluids by engineered carbons and possibly by environmental black carbon (char, soot).

Effects of Biochar on the Bioavailability of Agriculturally Important Chemicals.

Biochar is a coined term for the carbonaceous byproduct of high-temperature technologies that convert biomass waste into liquid or gaseous fuels. It is similar in properties to pulverized charcoal briquettes. Biochar has recognized potential value as a soil amendment, as it appears to increase soil fertility in some cases. Also, due to its inherent stability in the environment (reported half life of several hundred years), biochar may serve as a form of 'sequestered carbon' that, if it were produced on a large scale, could reduce carbon dioxide emissions and help mitigate climate change. Due to their high surface area and microporous nature, charcoal materials are strong adsorbents of organic compounds typically. Thus, a prerequisite to the widescale use of biochar as a soil amendment in agriculture is a thorough assessment of its effects on the biological availability of agriculturally important chemicals in soil, such as pesticides, existing contaminants, and natural plant signaling chemicals (allelochemicals).

Drs. Jason White, Joseph Pignatello and **Wade Elmer** conducted greenhouse experiments on a biochar from Dynamotive-USA. Two soils contaminated with the legacy pesticides chlordane and DDX (DDT + DDE + DDD) were amended with Dynamotive biochar at 0, 0.1, 1.0, and 10% (w/w) levels and then planted with zucchini (*Cucurbita pepo*). The amount of contaminant accumulated by the plants decreased significantly with increasing amounts of biochar. At the 10% amendment level, total chlordane and DDX content in the plants was reduced by 68 and 79%, respectively, relative to the control plants. At 10% biochar there was an adverse effect on plant growth. They further

studied the effects of biochar on the plant systems known to be impacted negatively by natural allelochemicals. The addition of biochar (0.32, 1.60 and 3.20 % (w/w)) to asparagus soils infested with *Fusarium* root rot pathogens increased asparagus plant weights and reduced *Fusarium* root rot disease. The addition of allelochemicals (coumaric, caffeic, and ferulic acids exuded from asparagus roots) involved in plant-mycorrhizal fungi signaling processes did not affect plant weights or disease, but reduced root colonization by beneficial mycorrhizae. However, the addition of biochar partially reduced the negative effect of the allelochemical mixture on mycorrhizal colonization. Finally, the addition of biochar at 3.5% to the sand potting soil reduced the negative effect of juglone, an allelochemical exuded by black walnut and butternut, on tomato plant growth and stunting and wilting of the fruit. *Impact.* These findings provide convincing evidence that biochar application to agricultural soil can, in specific circumstances, lower contaminant uptake by plants and reduce allelochemical activity.

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 6924 samples and answered 2087 related 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

The Valley Laboratory is a multidisciplinary Department that conducts research on insects, diseases, soil nutrition, mycology, integrated pest management and weeds of concern to commercial agriculture and homeowners in Connecticut. The Valley Laboratory was originally established by the Board of Control in Windsor in 1921 to conduct tobacco research. While research on shade and broadleaf tobacco continues today, the mission of the Department has greatly expanded to reflect the diverse agriculture present in the State. In addition to research, Valley Laboratory scientists and staff diagnose insect and plant health problems, test soils for fertility and structural analyses, conduct outreach to growers and homeowners by speaking to professional and community groups, host informational meetings, and assist students.

RESEARCH ACTIVITIES

Activities on the farm: There were a total of 65 experimental plots during the past year at the Windsor farm. Seven Windsor-based scientists had 36 of these plots; seven New Haven-based scientists and a University of Connecticut graduate student were using 22 plots. The remaining plots were maintained by the Farm Manager as rotation crops or for seed collection. 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. He expertly maintained the many field plots and addressed the specific needs of each scientist. He and his summer assistants 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.

Biological Control of Hemlock Woolly Adelgid

Eastern hemlock, *Tsuga canadensis*, is an important native conifer climax species which provides essential wildlife habitat and cover. Hemlocks also protect watersheds and maintain critical cool stream temperatures for native trout species. In the garden landscape, it is a popular tree and a common component in Connecticut's state parks and forests. Since 1985, eastern hemlocks in Connecticut have been under attack by the non-native hemlock woolly adelgid, *Adelges tsugae*, an accidental introduction from southern Japan. Biological control using imported predators of the adelgid is a major long-term strategy for reducing the impact and spread of HWA in our eastern forests.

Field Research:

In Connecticut, research, release and evaluations of a tiny ladybeetle, *Sasajiscymnus tsugae*, imported from southern Japan in 1994 to predate on HWA have been ongoing for 15 years, supported by the USDA Forest Service. Over 176,000 *S. tsugae* have been released in 26 Connecticut forests and parks since 1995. **Dr. Carole Cheah** continued a multi-year study collecting annual crown data on hemlock health and adelgid population trends from September to November 2008 from 16 established 8-14 year release sites throughout the state and 7 uninfested hemlock plots to evaluate long term effects of biological control releases and potential for hemlock recovery in infested stands. From February-early May 2009, **Dr. Cheah** also collected adelgid-infested foliage from 19 sites throughout the state and determined the average winter mortality of 1,000 HWA per site. Data were used to generate information on the overall condition of the state's hemlocks, predict subsequent trends of HWA populations in different regions of the state and advise homeowners and forest managers on strategies for control of HWA.

Results:

- The majority of hemlock stands, where the beetle has been released and established, continue to exhibit sustained crown recovery with little or no tree mortality, dispensing with the potential costs of tree removal of hazard or dying trees and preserving the quality of recreational use for Connecticut's citizens.

- Hemlock health was maintained in 69% of biological control release stands. Of the 11 sites, which are associated watershed areas, 82% maintained healthy crowns for watershed protection, which include 2 nationally designated "wild and scenic rivers".
- Annual assessments of winter mortality of adelgid in Connecticut since 2000 have been significantly correlated to minimum winter temperatures. The winter of 2009 experienced a severe cold period in mid-January although overall, the winter of 2009 ranked as 48/115. Statewide, HWA mortality averaged > 90% over all climatic regions leading to overall large-scale reductions of HWA populations in the spring.
- After a drought in late summer 2007, 31% of release sites (n = 5) with concurrently heavy infestations of elongate hemlock scale, *Fiorinia externa*, showed signs of decline in crown health (average foliage transparency 35.3) while 69% of sites (n = 11) with an adelgid infestation history of 8-14 years continued to have healthy crowns (average foliage transparency 22.6) comparable to that of uninfested baseline sites (average foliage transparency 21.7). No hemlock mortality was reported in those 11 sites.

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 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 2007. Based on this research, *S. tsugae* is being commercially reared and released in multiple states. As a consequence, homeowners were able to reduce costs in number of treatments to control HWA on landscape trees.

Laboratory Research:

Dr. Cheah maintained an experimental *S. tsugae* colony with lines originating from the first shipments from Osaka, Japan in 1994 and 1995 and a more recent line from a different location, Kobe, Japan, obtained in 2006. Current laboratory studies, in collaboration with Dr. Allen Cohen of Insect Diet and Rearing Research, LLC, and supported by the USDA Forest Service, are aimed at the development of an artificial diet and/or supplement to augment and improve the mass-rearing of adelgid predators for implementation in infested forests. An improved artificial diet developed in 2007 by Dr. Cohen was further adapted and tested in 2008 to see if supplements improved *S. tsugae* adult survival, especially under rearing conditions with unpredictable quality of HWA prey. Research into development of artificial diets for other imported predators of HWA was also initiated in 2008-2009. Provision of the Cohen diet in a readily usable form in mass rearing predator laboratories was tested for *Laricobius nigrinus*, another important HWA predator imported from the Pacific North West in cooperation with Virginia Tech.

- A dietary supplement, developed by Dr. Cohen and **Dr. Cheah,** greatly improved survival and storage of mass-reared adelgid predators during shortages of prey material. In Windsor, *S. tsugae* survival in the summer and fall of 2008 was 80-90% when

provided with the Cohen supplement in addition to HWA foliage, as compared to only 10% survival in control cages. Survival was enhanced over a wide range of temperatures. *L. nigrinus* new emergent adult mortality was also significantly reduced when provided with the Cohen supplement between foliage changes.

Sasajiscymnus tsugae feeding on artificial diet placed on hemlock

Laricobius nigrinus (Coleoptera:Derodontidae) feeding on Cohen dietary supplement

Impact: A superior adult supplement supporting enhanced adult predator survival is highly beneficial and cost effective to the labor-intensive mass-rearing production in insectaries which produce HWA biological controls.

Establishment of a HWA predator field insectary

A field insectary at the Lockwood Farm was established with plantings of HWA-tolerant species of western, mountain and northern and southern Japanese hemlocks in May 2009 as a new method for eventually rearing *S. tsugae* acclimated to the northeast climate for biological control releases. This project is funded by USDA-APHIS.

Planting hemlocks for a HWA predator field insectary at Lockwood Farm

Impact: Field-reared predators would be expected to be more vigorous and acclimated and provide an important source for future biological control implementations to control HWA.

Diet development for biological controls of invasive weeds

Mile-a-minute weed, *Polygonum perfoliatum*, originated from Asia and was first discovered in the eastern U.S. in the 1930s and is classified as a noxious weed in Connecticut. It currently infests 9 eastern states and was first recorded in Connecticut in 1997. In Connecticut, 15 towns are currently infested and affected areas are rapidly increasing in 2009. This rapidly growing prickly and prolific vine is annual in its northern range but quickly forms dense thickets which displace native vegetation and reduce plant diversity. An introduced weevil, *Rhinoncomimus latipes*, has been successfully reared and released for control of this invasive species in the Mid-Atlantic states. However, weevil rearing is dependent on greenhouse propagation of the vine and the development of an artificial diet for mass rearing would be beneficial in improving efficiency, space required for mass production and enhancing survival during shipments. **Dr. Cheah** is collaborating with Dr. Allen Cohen on the development of an artificial diet for *R. latipes* in cooperation with the Phillip Allampi Beneficial Insect Laboratory

(PABIL), New Jersey Department of Agriculture, Trenton, NJ, with funding support from the USDA Forest Service.

In collaboration with **Dr. Todd Mervosh** of the Valley Laboratory and Donna Ellis from the University of Connecticut, potential sites were located for the first releases of *R. latipes*, in Connecticut, in cooperation with the University of Delaware, NJDA PABIL, DEP (CT) and with the support of USDA Forest Service and USDA APHIS PPQ.

Results:

- **Dr. Cheah** and Dr. Cohen have developed several base nutritional diets and extracts (solid and liquid) from mile-a-minute weeds (stems, leaves and combinations of stems and leaves) which elicit adult and larval *R. latipes* feeding and continue to work on refining and improving the palatability and texture of the best diets.

Impact: Connecticut is now an active participant in the increasingly important arena of biological control research of invasive weeds. Establishment of biocontrols for mile-a-minute would provide a natural control to limit spread and range expansion of a noxious and prolific invasive weed.

Chemical control of HWA

Dr. Richard Cowles has continued to improve the understanding of chemical control of hemlock woolly adelgid with systemic insecticides. Research conducted in the past year has demonstrated that trunk spray application of dinotefuran results in concentrations in plant tissues of 100 – 200 ppb, which do not appear to decrease over a 13-month interval. Tests on seedling hemlocks were not able to determine a minimum effective dosage of dinotefuran to kill adelgids, because there were no surviving adelgids with any of the dosages. Clothianidin, which is closely related to dinotefuran, and flonicamid are also readily absorbed through and translocated from bark to foliage. Products translocated to a lesser degree are spirotetramat and imidacloprid. Pymetrozine and azadirachtin are not translocated to foliage when applied to bark.

Because there are concerns about pollinator exposure to insecticide residues resulting from quarantine treatment of maples with imidacloprid, a study was initiated in 2009 to investigate the comparative dynamics of imidacloprid and dinotefuran residues in Norway maples. These products were applied as either a soil injection or a trunk spray to carefully selected size classes of trees. It is known from other hardwood trees that dinotefuran residues decay during one season. If the same is true in maples, then it may be possible to apply Safari following bloom to provide a lethal dosage to adult and newly hatching Asian longhorned beetle larvae, while being protective of honey bees and other pollinators.

***Impact*:**

- All southeastern states with eastern hemlocks have adopted Special Local Needs labels for use of CoreTect, a slow-release tablet formulation of imidacloprid, and a trunk spray application method for Safari (dinotefuran). **Dr. Cowles** originated these approaches for protecting trees from hemlock woolly adelgids.
- The Greater Smoky National Park is adopting use of dinotefuran to preserve tens of thousands of hemlock trees from hemlock woolly adelgid. Choosing dinotefuran over imidacloprid appears necessary for maintaining the health of infested trees because warmer winters and drought stress has led to trees dying within 3 years of initial infestation. Application guidelines were developed by park staff in consultation with **Dr. Cowles**; evidence from his work will lead to approximately twice as many trees being preserved with the same amount of insecticide.
- The Delaware Water Gap National Park is using the minimum effective dosage treatment method to maximize the number of hemlocks they can preserve for the amount of funding available.
- Several arborists have adopted the trunk spray method for managing hemlock woolly adelgid and elongate hemlock scales for hemlocks in Connecticut, especially on sites with large numbers of trees. This treatment method is easily applied, precise, effective, and minimizes the contamination of soil with insecticides.

***Chemical insect pest management*:**

Annual bluegrass weevil continues to be the most difficult insect pest to manage on golf course turf. Pyrethroid resistance resulting from about 12 years of intensive selection have led to serious problems of cross resistance to other insecticides, due to enhanced metabolic detoxification. Turf insecticides with new modes of action include chlorantraniliprole, indoxacarb and spinosad. Field tests of these products with potential synergists revealed that use of DMI-class fungicides to block mixed function oxidase enzymes is not a reliable method to enhance their performance. Of the newly available insecticides, only spinosad has reliable efficacy against this weevil. Discrepancies between laboratory demonstrations of DMI products' ability to synergize other insecticides, and their poor performance in field trials, suggests that suppression of detoxification enzymes activity with synergists may be a transient effect overcome by enzyme induction.

In collaboration with Dr. Anderson, **Dr. Cowles** has determined that only a subset of Type 2 pyrethroids have intrinsic toxicity to a bed bug population collected in Connecticut. This suggests that carboxylesterase enzyme detoxification of pyrethroids is probably involved with other mechanisms, such as target site insensitivity, in pyrethroid resistance. Dust products containing silica aerogel appear to be highly toxic to bed bugs, so the addition of pyrethrins or pyrethroids to these dusts is not warranted.

***Impact*:** A deeper understanding of the pharmacology and toxicology of these pesticides and synergists that may be used in the field provides the basis for delaying or circumventing insecticide resistance. **Dr. Cowles** developed a diagnostic assay to detect pyrethroid resistance in annual blue grass weevils that is being used in seven states.

IPM for Nurseries

Dr. Hugh Smith works with nurseries to establish pest management priorities and train nursery workers in methods for monitoring and identifying arthropod pests. He produces fact sheets on monitoring and management of arthropod pests of nurseries in collaboration with **Rich Cowles** and Rose Hiskes that are available on the CAES website. He and Rose Hiskes have updated sections of the 2006 IPM guide created by Ken Welch and Tim Abbey. He has assisted in the establishment of a web-based IPM guide for arborists and provides training and IPM material in Spanish for Spanish speaking nursery workers. A series of updated fact sheets, including a monitoring fact sheet in Spanish, are now available on the Internet.

Impact: Improved monitoring skills and accurate insecticide information enables nursery growers to reduce insecticide use. By providing IPM training to Spanish speaking nursery employees, these workers can also contribute to IPM programs and insecticide reduction.

Strawberry sap beetle research

Dr. Smith has begun screening softer insecticides as alternatives for pyrethroids for management of the strawberry sap beetle (*Stelidota geminata*). In addition, he is developing simple, inexpensive trapping methods so that growers can determine when the sap beetle is becoming established near strawberry fields.

Impact:

Strawberries are an important component of Connecticut's agricultural economy. Improved monitoring and least toxic approaches will help strawberry growers reduce insecticide use.

Mycology Research:

Dr. DeWei Li conducts 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 studied the effects of Christmas trees on airborne molds in residences during the Christmas season in 2008. Preliminary results indicated that firewood is the major source for elevated airborne fungi in residences during the Christmas season, rather than Christmas trees.

Impact: There has been recent negative publicity on the effects of Christmas trees on airborne molds and indoor air quality. Future research should focus on not only Christmas trees, but also, fireplace use, and human activities to determine the real source for elevated airborne spore concentrations during the Christmas season.

***Fungal succession on building materials*:**

Dr. Li continues research on fungal succession on drywall with water damage at different levels. The data showed that fungal population composition is positively related to the level and duration of water damage. With time, the infested areas continue to enlarge significantly, and fungal biodiversity has increased. Fungal compositions and populations showed a succession pattern. Water-loving fungi, such as *Stachybotrys chartarum*, *Chaetomium globosum* and *Ulocladium* spp., appeared after long term water damage and their colonies increased with time.

***Impact*:** The data indicated that severity of water damage effects the fungal species composition on the wall units. Fungal species composition changed over time on the wall units with the duration of water damage. More water-loving fungi appear after 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.

Fungal taxonomy and systematics:

Dr. Li visited the Farlow Library and Herbarium at Harvard University to access mycological literature and examine specimens of *Stachybotrys* and *Memnoniella*. A loan of 28 specimens was arranged. De-Wei annotated the specimens based on the latest taxonomic information. DeWei also visited the New York State Museum to examine specimens of *Stachybotrys* spp. and the type specimen of Stachybotrys elongata collected by C. Peck. The examination found that *Stachybotrys elongata* is not a species of *Stachybotrys*. Other fungal specimens were collected through the year indoors and outdoors. One undescribed species from an indoor environment and two undescribed species of hyphomycetes were found from specimens collected during a field trip in Hubei, China in the summer of 2008. Two manuscripts describing these species are in preparation.

Impact: Annotating specimens is an important part of fungal taxonomy/systematic. Since taxonomy/fungal biosystematics keep developing and there are some significant changes in the deposition and placement of some fungal taxa. Annotation of specimens will update taxonomic information of the specimens and advance the science of mycology.

Root tip gall on salt marsh cordgrass caused by the root-knot nematode (stained red).

***Salt Marsh Decline**:*

Sudden Wetland Dieback (SWD) has recently come to the attention of scientists in New England. It consists of the rapid disappearance of salt marsh *Spartina alterniflora* grass, resulting in barren mudflat that is often recognizable by 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. **Dr. James LaMondia** and Dr. Elmer associated a plant parasitic root-knot nematode, *Meloidogyne spartinae*, and pathogenic *Fusarium* sp. with declining *Spartina alterniflora* in Connecticut. The nematode causes swollen galls at the root apex and necrotic pockets in the root cortex without swelling. We have observed as many as 30 circular to ovoid terminal galls per g root and a single gall may contain several hundred eggs and infective juveniles. In greenhouse tests, only *S. alterniflora* plants formed root galls in response to infection and increased *M. spartinae* populations. *Spartina patens, S. cynosuroides, Juncus gerardii, and Distichlis spicata* were non-hosts. *M. spartinae* was recovered in different densities in transects from the mean low tide point to the high marsh. The effects of *M. spartinae* and a pathogenic *Fusarium* sp. isolated from *S. alterniflora* on grass growth and vigor were investigated alone and in combination. Eight weeks after inoculation, there were no effects of the pathogens on shoot or root weight, but the weight of rhizomes was reduced and root disease was nearly doubled. *Fusarium* had the largest impact on the plant, but nematodes, even at the low numbers inoculated, further increased disease and rhizome stunting. The long-term effects of *Fusarium* and *M. spartinae* on *S. alterniflora* and the role of the pathogens in marsh decline in the northeast remain to be determined.

Impact: 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.

Biodiesel oilseed crops

There has been renewed interest in the United States in the development of alternative energy sources and fuels, and the Connecticut Legislature has requested that The Station investigate oilseed crops for biodiesel fuels. To this end, **Dr. LaMondia** is evaluating alternative fuel oilseed crops either as main season summer crops or as winter cover crops with spring seed harvest. The oilseed crops used for producing biodiesel are typically soybean or canola (also called rapeseed), *Brassica napus*. These crops are not high value and may 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 are 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. **Drs. LaMondia** and McHale are conducting research on the use of oilseed plants in integrated pest management. For example, *Brassica* plants such as canola or rapeseed produce glucosinolates 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 soil fumigants. The use of plants or plant products incorporated into soil to deliver these breakdown products to control pests is termed biofumigation. Seeds of these species typically produce one predominant type of GSL. Using reverse phase HPLC, we characterized species by predominant GSL type, and conducted bioassays to determine which GSLs are most toxic to the Northern root knot nematode *Meloidogyne hapla*. The predominant GSLs tested from plant seed sources were: progoitrin (*Brassica napus* 'Dwarf Essex', 'Sterling'), sinigrin (*B. juncea* 'Pacific Gold' and *Brassica nigra*), 4-methylsulfinylbutyl (*B. oleracea* 'Calabrese'), not identified (*Camelina sativa),* epiprogoitrin (*Crambe abyssinica* 'Meyer'), 4-methylthiobutyl (*Eruca sativa*), and sinalbin (*Sinapis alba* 'Ida Gold'). Bioassays (48 hr exposure) were performed using ground seeds of the above plants plus lettuce *Lactuca sativa* 'Simpson Elite' as a no GSL control. The highest nematode survival was observed in *S. alba* and *E. sativa* treatments. Toxicity was similar to the *L. sativa* control, suggesting low toxicity for sinalbin and 4-methylthiobutyl GSL. Higher nematode toxicity was observed in the Crambe treatments (60% mortality at 1.3 g seed/L soil), where epiprogoitrin predominates. The overall highest toxicity levels were observed with *B. nigra,* and *B. juncea* Pacific Gold (70 and 100% mortality at the 1.3 g seed per L soil rate, respectively), both of which have sinigrin as the predominant GSL. Sinigrin levels were 3 fold higher in seeds of Pacific Gold vs. *B. nigra*, which correlated with the higher mortality scores. The results point to sinigrin as the glucosinolate with the most activity and Pacific Gold as the most promising crop for management of *M. hapla* by biofumigation.

Soybeans do not produce compounds for biofumigation, but have value in IPM as they can be grown as summer rotation crops, increase soil nitrogen levels, and manage weeds. Soybeans can be grown without fertilizers, compete well with weeds and allow use of herbicides with different activities. Soybean and *Brassica* meals also have value as organic fertilizers. About one million pounds of organic meal-based fertilizers (primarily cottonseed meal) are used

each year in the Connecticut River Valley. Some growers are now producing and using their own soybeans as fertilizer supplements.

Impact: These crops may maintain soil quality, 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.

Brassica oilseed plots for biodiesel production

Tobacco disease research:

A number of diseases can cause serious losses to the cigar wrapper tobacco types grown in the Connecticut River Valley and are being held in check by multiple approaches. **Dr. LaMondia** conducts a breeding program to develop resistance to the tobacco pathogens: *Fusarium oxysporum* (causing Fusarium wilt); *Globodera tabacum tabacum* (the tobacco cyst nematode); tobacco mosaic virus, and *Peronospora tabacina* (blue mold) for both shade and broadleaf types. He has shown that the development and deployment of resistant plants is the most effective, economical and environmentally safe means of managing disease.

Blue mold has been a recurring problem in Connecticut from 1997 through 2007, causing losses up to the tens of millions of dollars annually. Grower education about spray timing and coverage has greatly reduced blue mold severity in recent years. Tobacco lines with resistance to blue mold were collected from different sources, crossed to CT types, selected over ten

generations and evaluated under field conditions in Windsor. Blue mold incidence was compared between a susceptible commercial cultivar with and without fungicides and resistant lines. Healthy leaves harvested over the length of the epidemic were nearly double for resistant lines grown without fungicide application compared to susceptible plants with commercial standard fungicides applied. The average numbers of lesions per leaf, lesion size, and number of spores produced per cm^2 were reduced for resistant lines.

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 the spread of the pathogen and kept infested fields in production without soil fumigation. All advanced shade and broadleaf lines under development continue to be screened for high levels of wilt resistance. In the past two years we demonstrated that Fusarium can be seed-borne and spread through plant propagation, explaining the speed of spread and extent of infested fields throughout the Valley.

The tobacco cyst nematode increases Fusarium wilt of broadleaf tobacco and reduces shade tobacco growth and leaf yield (losses of up to 15%). 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. 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. In cooperation with researchers from Virginia and North Carolina, **Dr. LaMondia** determined that gene(s) from *Nicotiana plumbaginifolia* (Ph_p gene) that conferred resistance to race 0 of *Phytophthora nicotianae* also reduced cyst nematodes. These results indicate a close linkage or association between a likely single, dominant gene (Ph_p) for resistance to *P. nicotianae* and suppressed reproduction by the cyst nematodes *G. t. solanacearum* and *G. t. tabacum*. This gene or linked genes may result in an additional control of the cyst nematode and aid in understanding pleiotropic resistance to multiple pathogens.

Tobacco mosaic virus infected broadleaf tobacco

From 2002 to 2007, tobacco mosaic virus (TMV) infection resulted in significant commercial losses ($3 to $5 million) due to green spot development on TMV-susceptible shade and broadleaf tobacco. Our research demonstrated the association of green spot with TMV, and determined that plant resistance was the single most important factor for reducing green spot. All new shade and broadleaf lines being produced are selected for single dominant gene resistance to TMV.

Currently, an advanced broadleaf tobacco line with resistance to the tobacco cyst nematode, Fusarium wilt, TMV and blue mold is being field tested in commercial production fields. The line, B2, has performed as well as the current standard over the last three years.

Fusarium-wilt resistant (left) or susceptible (right) broadleaf tobacco.

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.

Tobacco IPM

Many of Connecticut's tobacco growers continue to rely primarily on broad spectrum insecticides such as organophosphates and carbamates for insect pest management. Newer insecticides including neonicotinoids and anthranilic diamides can help tobacco growers manage certain pests while reducing potential negative environmental impacts. **Dr. Hugh Smith** is conducting field trials to provide growers with additional information on the efficacy of newer tobacco pest management materials. Results will help tobacco growers manage aphids and budworm.

Impact:

Greater reliance on insecticides with improved environmental profiles will help tobacco growers reduce insecticide use and lessen environmental impacts.

Rotation crops for nematode management

Annual crops including Canadian forage pearl millet (*Pennisetum glaucum*) hybrid 101, velvetbean (*Mucuna* spp.), rapeseed (*Brassica napus*) cv. Dwarf Essex, black-eyed Susan (*Rudbeckia hirta*) and buckwheat (*Fagopyrum* spp.) were evaluated as rotation or green manure crops for suppression of plant parasitic dagger (*Xiphinema* spp.) and lesion (*Pratylenchus* spp.) nematodes. Many old orchard sites are infested with lesion and dagger nematodes and both nematodes have the potential to cause problems on young trees in replant sites. Two sets of field plots were established in Connecticut by **Dr. LaMondia** and in Pennsylvania by cooperator Dr. John Halbrendt. All plots were planted with seed from the same seed lot to eliminate variability. Canadian forage pearl millet suppressed lesion nematodes but was a good host for dagger nematodes. Dwarf Essex rapeseed reduced populations of dagger nematodes only after incorporation as green manure but was a host of lesion nematodes and did not suppress lesion nematode populations. *Rudbeckia* suppressed lesion but not dagger nematodes. Buckwheat was included as a susceptible control and was a good host for both lesion and dagger nematodes. Velvetbean has been reported to have nematicidal activity but our results showed that it was a good host for both lesion and dagger nematodes and was not nematicidal as a green manure. Rotation crops offer an environmentally friendly alternative to chemicals for nematode control but as this research demonstrates, it is important to know which nematodes are present and what effect a rotation crop may have on the population.


Rotation crops for nematode management.

Nematode IPM outreach

Dr. LaMondia, in cooperation with Drs. George Abawi of Cornell, Beth Gugino of Penn State, and Deb Neher of UVM, conducted a series of Train-the-trainer workshops as a platform for extending nematological outreach in the northeast region of the U.S. Financial support was provided from the NE-SARE Professional Development program. A full-day, hands-on workshop was developed to educate and train participants on nematode biology and ecology, diagnosis of symptoms, sampling, on-farm visual assessment using soil bioassays for root-knot and lesion nematodes and management of plant-parasitic nematodes on vegetables, small fruit and ornamentals. From 2007 to spring 2009, a total of nine workshops have been held in New York, New Hampshire, Connecticut, Vermont, Rhode Island, New Jersey, Pennsylvania and Maine. Participants were county extension educators, crop consultants, university personnel, federal and state government employees and interested growers. The workshops were advertised and promoted in state and regional newsletters, email list-serves, grower meetings, web-postings and through direct communication with project leaders, county extension educators and previous workshop participants. Participants received a binder containing hardcopy resources as well as a CD-Rom containing workshop PowerPoint presentations, fact sheets and bioassay protocols. In addition, soil sampling and bioassay kits for root-knot and lesion nematodes were also provided. The goal of these workshops is to disseminate knowledge on the diagnosis, assessment and management of plant-parasitic nematodes to enable growers to manage nematode problems on an as needed basis with the ultimate goal of encouraging growers to design a whole-farm nematode management plan. A follow-up survey will be distributed to all participants in the upcoming

year to assess how the skills and knowledge acquired during the workshop were incorporated into their various and/or communications with growers or if the participant was a grower what impact has it had on their production practices and pest management decisions.

Conducting a nematode outreach program.

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, giant hogweed and Japanese stiltgrass. **Dr John F. Ahrens**, Plant Scientist Emeritus has completed almost 17 years of service at the Connecticut Agricultural Experiment Station's Valley Laboratory following his official retirement in 1992 after 35 years of service. By cooperating in the National IR-4 program and obtaining safety and efficacy data in experiments, he has helped to obtain federal and state registrations for all of the current herbicide tools that are available for use by Connecticut and regional growers.

Invasive plants:

Mile-a-minute vine (*Persicaria perfoliata*) 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.

Japanese stiltgrass (*Microstegium vimineum*) is a relatively new invasive plant in Connecticut, primarily in floodplain and in the understory of forests. This non-native annual grass spreads rapidly and forms dense stands that crowd out native plants and suppress regeneration of tree seedlings. Along with Dr. Jeffrey Ward and his research group, **Dr. Mervosh** recently initiated an extensive study of non-chemical and herbicide-based treatments for management of Japanese stiltgrass in a woodland along the Connecticut River in East Haddam, CT. The study will continue until the fall of 2009. The parcels of land are owned by the East Haddam Land Trust and The Nature Conservancy, and the CT Department of Environmental Protection will provide funding for the project.

The objective of this study is to identify at least one non-chemical and at least one herbicide-based control method that will provide excellent control of Japanese stiltgrass at reasonable cost with minimal harm to native vegetation. This information will be highly useful for the DEP, The Nature Conservancy, land trusts and other organizations that need to develop management plans for Japanese stiltgrass.

Dr. Mervosh has been involved for several years with a program designed to locate and eradicate giant hogweed (*Heracleum mantegazzianum*), a large perennial in the parsnip family, in Connecticut. Dr. Mervosh cooperates with personnel from UConn Cooperative Extension System and the USDA APHIS. 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. However, each year some plants turn out to be giant hogweed. In those cases, Dr. Mervosh provides control information for the landowner, or with permission of the property owner, eradicates the plants with directed sprays of triclopyr herbicide.

Impact: These efforts have been valuable in reducing the number of giant hogweed plants in Connecticut, preventing the establishment of new populations, and minimizing the potential for any human health impact arising from contact with hogweed sap.

Christmas Trees

Dr. Cowles tested several products to determine whether they could be used to provide selective control of armored scales in Christmas tree plantations. The products included a commercially available insect pathogenic fungus (*Beauveria bassiana*), a new systemic insecticide (spirotetramat), and soil vs. basal trunk spray applications of dinotefuran. Only the basal trunk spray of dinotefuran was effective; this method was as effective as the positive control, a foliar spray with bifenthrin. The dose-response component of that experiment showed no loss of dinotefuran effectiveness at the lowest dosage tested. The percent parasitism of scales in trees treated by this method was not statistically different from the untreated checks, suggesting that this approach may permit integration of chemical and biological control.

Impact:

- Many Christmas tree growers have adopted the dinotefuran basal trunk spray to suppress armored scales in their plantings. Other growers are continuing to use the foliar application of bifenthrin for the same purpose. Both approaches were developed by **Dr. Cowles**.
- Growers have successfully eliminated Douglas-fir needle midge and white pine weevils from their Christmas tree plantations by following treatment guidelines provided by **Dr. Cowles**.

In an experiment begun in 2001 in fertile soil at the Valley Laboratory, **Mr. Rathier** is finding that Fraser fir Christmas trees that have never been fertilized differ very little in size and visual quality when compared to fertilized trees. While natural fertilities of other soils may not be as great as those at the Valley Lab, these results suggest that many growers could at least reduce their fertilizer use without affecting yield or tree quality. Results of this experiment could impact the industry by helping growers realize the fertility values of their soils, possibly reducing fertilizer expenses and nutrient loss to surface and ground water.

In another experiment begun in 2001, **Mr. Rathier** has found that neither Christmas tree transplant survival nor subsequent growth and quality is improved by biostimulants, mycorrhizal fungi and planting gels sold as soil amendments for use at planting. Grading bare-root transplants by genetically related root volume, however, did reveal that transplants with greater volumes grow faster than those with smaller volumes, gaining a year or more before harvest. A similar experiment conducted by **Mr. Rathier** and **Dr. Cowles** revealed that root volume differences induced mechanically (by white grub injury) resulted in similar growth differences. These results could impact the industry by eliminating expensive amendments at planting and zone planting by root grade to allow for quicker rotations.

Impact: Increasing Christmas tree transplant survival should be to help growers optimize survival and avoid costly replanting and losing time in production areas.

SERVICE ACTIVITIES

Requests for information:

A total of 8,674 inquiries were answered at the Valley Laboratory during the past year. The majority of these queries (75%) were answered by both **Mr. Thomas Rathier** (5,604), and **Mr. John Winiarski** (902) in the inquiry office, and by **Drs. LaMondia** (11%) and **Mervosh** (5%). About 61% of the information requests were from the public sector; the remainder was from commercial growers and pest control operators. Inquiries by subject category were as follows: arthropod pests (30%); plant diseases (15%); general horticultural information (20%); soil fertility and water issues (15%); pesticide use (8%); weed control (3%); and mammals, birds and reptiles (2%).

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 assisted with a Section 18 registration for Quadris and Manzate fungicides for control of blue mold in shade tobacco.

Inquiry office perspective: Commercial agriculture:

Mr. Rathier made 38 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. Accurate and timely identification of pests or problems along with information on management strategies impact growers by providing them with approaches that are the most economical and least harmful to surrounding ecologies.

Many diagnoses were centered on plant responses to weather conditions. The 2008 growing season started with fairly mild conditions in May and June which got most annual crops off to a good start. Beginning in July and continuing though most of the fall, record rainfalls occurred, resulting in frequently saturated soil conditions which ultimately impacted plant growth. This was in sharp contrast to the significant drought conditions that prevailed in 2007. Winter temperatures were moderate with a few periods of extreme cold. Spring 2009 began promisingly with a short period of unseasonably warm temperatures in late April but May and June were characterized by almost continuous cloudy conditions and frequent rainfall.

Newly planted and mature Christmas trees, a crop that rarely receives irrigation, suffered significant drought related losses in 2007 and experienced the reverse in 2008. Frequently wet soils were often oxygen starved and root growth was limited. Consequently, newly planted young trees died outright and larger trees often lost needles and new growth. 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 disease problems. Swiss needlecast was also observed in spring 2009.

Similar problems were observed on overwintering woody plants in production with desiccation injuries occurring on broadleaf evergreens and conifers. Woody and herbaceous plants growing in containers outdoors in many nurseries experienced problems resulting from irrigation water excesses that limited root growth. 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 2009 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. Cool, dark conditions in late spring resulted in greater incidence of 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, if drainage was good, actually had a good growing season in 2008. Because of wetter conditions, however, foliar and root diseases were more common. Persisting wet conditions in spring 2009 resulted in a greater incidence of leaf spot, red thread and brown patch. Forage crops also grew well in 2008 but harvests may have been hampered by rain. Silage crop growth was limited by the rain in 2008 and yields were reduced. In spring 2009, Hessian fly was observed on poorly developed crops of winter rye. This is the Valley Lab's first observation of this pest that is commonly found on wheat throughout the US. Close monitoring and avoidance strategies will be needed to ensure that the problem does not affect future crops.

Small fruit harvests were above average during the 2008 season due to ample rainfall. Spring 2009 saw little or no frost damage to strawberries and surprisingly good yields but wet conditions limited the pick-your-own trade. Tree fruits experienced good harvests in 2008 despite greater disease pressure. Pollination in spring 2009 was very successful.

Vegetable growers experienced good harvests in 2008, but bacterial spot and wilt diseases were greater problems for peppers and tomatoes. Other vegetables were similarly affected. Growers using plasticulture or row covers saw fewer problems. The planting season in 2009 was plagued by prolonged cold, wet soil conditions. Many growers had to replant fields. By June 2009 samples of late blight (tomatoes and potatoes) were arriving in the diagnostic lab.

Tobacco acreages did well in 2008 for the most part as long as soils drained well. Excessive rains in September hampered curing efforts, especially for broadleaf tobacco and numerous barn rots were observed. Little or no blue mold was observed in the Connecticut River Valley despite wet conditions thanks to greater attention to the proper timing of fungicide spray coverage. Greater incidence of black root rot (*Thielaviopsis basicola*) was observed in many fields that stayed wet or received large amounts of manure in recent years. Ordinary insect problems, such as budworms and aphids were present in many fields. The transplant production season in spring 2009 was quite successful, mirroring the good growing conditions all

greenhouse crops received. Some black root rot and root rots caused by *Pythium* and *Rhioctonia* were observed with few large losses.

COMMERCIAL AND HOME LANDSCAPES

As with commercial agriculture, frequent rains and saturated soil conditions led to most of the serious problems for woody plants in landscapes in both 2008 and spring 2009. Drought conditions in previous years likely resulted in deeper root systems which may have been at greater risk to oxygen deficits. Injuries similar to those caused by drought to woody landscape plants became obvious even during the winter with significant browning of broadleaf and needled evergreens. 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 previous droughty conditions followed by the excessive rainfalls.

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 were 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 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 rebounded quite successfully in 2007-2008 after three difficult winters in a row. Cool moist conditions in 2008 allowed many hemlocks to recover and grow more vigorously. Short periods of extreme cold temperatures in January 2009 have apparently killed many adelgids as most arriving in the diagnostic lab have been dead. Also plaguing hemlocks and other conifers were elongate hemlock scale and spruce spider mites.

Gypsy moths were not widespread in most areas around the state despite the somewhat dry conditions in June 2008. Sprays were typically not needed but homeowners and landscapers were being cautioned to scout for egg masses in the coming winter and to be prepared to spray next year. Spring 2009 conditions favored the return of natural controls. Also observed in spring 2008 were forest tent caterpillars. Orange striped oakworms were again reported in Eastern Connecticut.

Other arthropods of note throughout 2008 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 viburnum beetle and lily leaf beetle, newcomers to Connecticut, continued to establish populations in northern towns. Viburnum aphids and assorted eriophyid mites were more numerous in spring 2008 than in typical years.

Diseases were more plentiful in 2008, and continued into spring 2009. Foliar disorders such as leaf spots, blights and anthracnose were more common. Anthracnose diseases 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 many more diseases and more substantial losses due to water excesses. Disease pressure was much greater on high maintenance lawns, and summer patch, brown patch, dollar spot, leaf spots, Pythium and red thread were all observed. Large numbers of scarab beetle adults were reported in early summer 2008 but white grub injury was limited due to better soil moisture and less stressed turf. Chinch bugs were not a problem in 2008. 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 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 often below the seeds 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 more numerous throughout 2008 and again in spring 2009 due to increased rainfall. Many ticks were submitted for identification. All black legged ticks were forwarded to the lab in New Haven for 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 has been an increase in oil or blister beetles in the genus Meloe in the fall. Some of these beetles are predaceous on ground bees and their populations seem to be following the solitary 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 increased problems with bed bugs was seen as samples were submitted in greater numbers 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. Accurate and timely identification of pests or problems along with information on management strategies impact homeowners by providing them with approaches that are the most economical and least harmful to surrounding ecologies.

Soil testing:

A total of 4,775 soil tests were expertly performed by **Mr. John Winiarski** during the past year. About 56% were performed for commercial growers, 37% for homeowners, 4% for municipalities, and the remainder for Station research. Of the commercial samples submitted, 45% were for landscapers; 29% for tobacco growers; 9 % for vegetable growers, 7% for nursery growers; 3% for golf course superintendents; 3% for fruit growers, 1% for Christmas tree growers; and the remainder for all other categories.

Gordon S. Taylor Conference Room:

Many agricultural organizations used the conference room at the Valley Laboratory regularly for their meetings. During the past year, 24 different groups used the room on 78 occasions. Our most frequent users were the Connecticut Farmland Trust, the CT Wine Association, Connecticut Rhododendron Society, Connecticut Chapter of the National Organic Farmers Association, Connecticut Department of Environmental Protection, Connecticut Nursery and Landscape Association, and Connecticut Invasive Plants Workgroup and Council. Jane Morrison scheduled the appointments and James Preste arranged the furniture for scheduled meetings and ensured that the room was available after hours.

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1019 Lead and Other Heavy Metals in Community Garden Soils in Connecticut. 6 pages. David E. Stilwell, Thomas M. Rathier, Craig L. Musante, and John F. Ranciato. (2008)

1020 Comparison of Heavy Metals in Community Garden Produce Versus Store-Bought Produce. 9 pages. David E. Stilwell, Thomas M. Rathier, and Craig L. Musante. (2008)

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